THE STATUS OF WHITE PINE BLISTER RUST CONTROL

Presented by S. B. Fracker at Conference,
Washington, D. C., December 3, 1934.

In working out a Federal white pine blister rust control program, it is necessary to give consideration first, to the importance of the white pines involved; second, to the amount of damage which the blister rust disease is doing, or is capable of doing in such stands; third, to the methods, costs, and effectiveness of control measures; fourth, to the progress which has already been made in connection with the problem; fifth, to the amount of work which remains to be done in the future and the ways and means of carrying out such work.

VALUE OF WHITE PINE

Representatives of the Forest Service, the States, and of other interests are present at this conference and a discussion of the economic importance and the present and potential future value of the white pine crop will largely be left to them. My own reference to this part of the problem will accordingly consist only of a general summary.

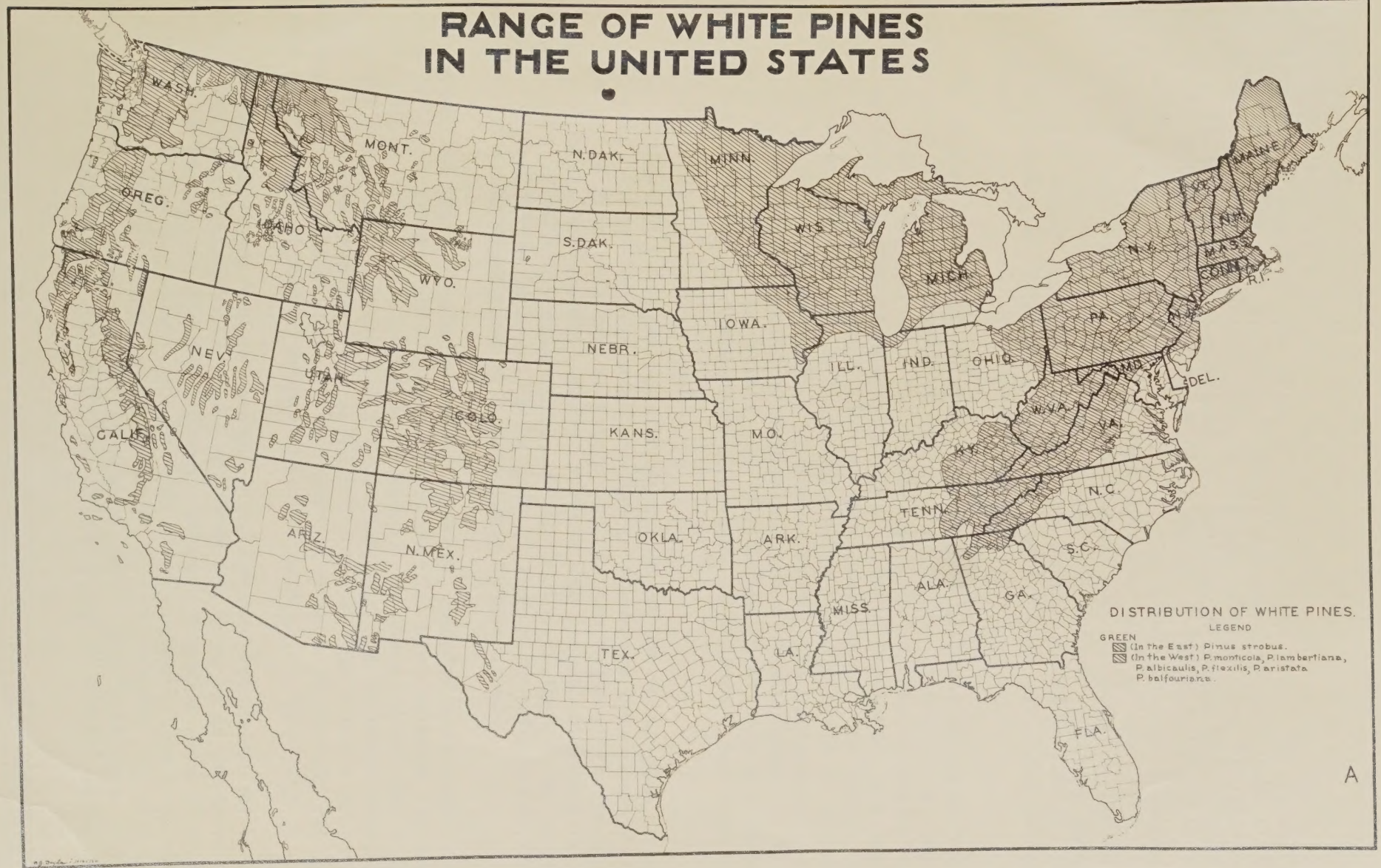
In the white pine blister rust problem we are concerned not only with the present immediate emergency, but even more with the forest conditions of twenty, fifty, and a hundred years or more from now. By protecting the young reproduction and second growth pine in the pine-growing areas we are providing for the forests of the future. Accordingly, it is these areas to which we must give primary consideration.

(U. S. Map (A): Distribution of White Pines)

There are three commercially important and valuable species of pine susceptible to blister rust growing in the United States. These are the eastern white pine ranging, as shown on the map, from Maine south to Georgia and west to Minnesota, western white pine centering in Idaho and extending into Montana, Washington, and northern Oregon, and sugar pine widely distributed in California and southern Oregon.

The stumpage value of the present mature stands, and the value of the annual lumber cut are important as showing the future natural resources which are menaced by the blister rust disease. I believe that a Forest Service estimate shows saw timber of 5-leaf pines in the United States amounting to over 69-1/2 billion board feet. In the Eastern pine area there are over 14-1/2 billion board feet; the western white pine shows a stumpage of 19,500,000,000 board feet; and the sugar pine showsa stumpage of 35,500,000,000 board feet. The total 69,500,000,000 board feet had a stumpage value in 1932 of over $400,000,000. This stumpage value, it is true, is calculated at a considerably higher rate than could probably be used at the prices of 1934, but the forest acquisition and management policy of the Department is based on the assumption that the present depressed timber sale values represent an abnormal and temporary condition.

RANGE OF WHITE PINES IN THE UNITED STATES



U. S. DEPARTMENT OF AGRICULTURE

The Census of Manufactures for 1929 shows an annual production of eastern and western white pine and sugar pine valued at $52,321,701.38. This includes 1,247,878,000 board feet of eastern and western white pine valued at $29,87 per M at the mill, a total value of about $37,274,115.86. This value of white pine at the mill was $4.21 per M greater than in the case of eastern and southern yellow pine, and $3,40 greater than for western yellow pine. The Census also shows that the quantity of sugar pine milled was 349,294,000 board feet, and that it had a value of $15,047,585.52 or $43.08 at the mill. The mill value of sugar pine was $17.39 greater than that of western yellow pine and was higher than the mill value of any other lumber cut in the United States with the exception of ash and walnut. The mill value of all lumber has since greatly decreased, but the value of white and sugar pine lumber has remained higher than that of other trees. In Idaho for example, in 1932, white pine averaged $23.84 per M and ponderosa pine $14.30.

It should further be pointed out that the ultimate stumpage and mill valuations of pine land represent only a part of the importance of the trees concerned. White pine is used for highly specialized manufactured articles such as patterns in machine shops, matches, painted furniture, and interior millwork, and the manufactured value of such products is very high. The trees are of scenic and recreational importance in many parts of the country and are of value in the prevention of soil erosion, the protection of watersheds, and from the standpoint of maintaining an adequate supply of fish and game. These intangible assets are inestimable in dollars and cents, but are recognized as of tremendous importance in different sections of the country.

On account of the slow persistent nature of the white pine blister rust, however, we are even more interested in the white pine acreage and the potential white pine crop of the future than in the value of the present standing timber. To determine areas in which the present stocking is sufficiently dense to make the maintenance of white pine on that tract important, certain standards have been set up in consultation with responsible foresters and based on their experience with developing forest areas.

Based on these standards, recent surveys, many of them carried out during the past summer, showed that the commercial pine acreage and reproduction covers the total of 14,200,000 acres. Of these, 7,600,000 acres are in the Northeastern States, 1,100,000 acres in the Southern Appalachians, 600,000 in the Lake States, some 2,700,000 acres in the Western white pine territory, and 2,200,000 acres in the sugar pine area (including the limited western white pine stands of Oregon with the sugar pine figures).

The question now arises especially in the Eastern States as to how much of the young growth will ever reach size for cutting as compared with what will be burned and cutover on land clearance programs or made valueless by pasturing or being crowded out by more rapidly growing and less valuable trees. In the Northeastern territory at least, practically all of the merchantable 5-leaf pine now present is second growth and represents timber which has reached maturity through the vicissitudes of varying agricultural

programs and fire conditions of the past 50 years. The 14,500,000,000 board feet of Eastern white pine previously referred to has therefore practically all reached maturity under such conditions. Owing to agricultural conditions in the Northeast, and the development of agriculture in the Mississippi Valley, it appears that when the young reproduction reaches harvesting size, it will be covering even more acreage than that on which pine is now growing, provided protection is established. The trend in these areas is predominantly toward forests and away from new agricultural developments on marginal lands. Since the western white pine crop is at present the only known profitable use for much of the land in the Inland Empire, every effort is sure to be made to keep that region in pine production.

ECONOMIC IMPORTANCE OF BLISTER RUST

History: We now come to the nature of the blister rust and the damage it causes. Blister rust was first found in Europe in 1854, probably having originated in Asia. It reached the United States about 1898 and was found in New York in 1906 on European black currant; and in New England on native pines in 1915 and 1916. It was accidentally introduced into British Columbia about 1910 and was discovered at Vancouver and in western Washington in 1921.

Since its introduction, this destructive fungous disease has become established in 21 of the 35 States in which the white pines occur, as shown in orange on this map.

(Map B): Range of White Pines and Blister Rust in United States.

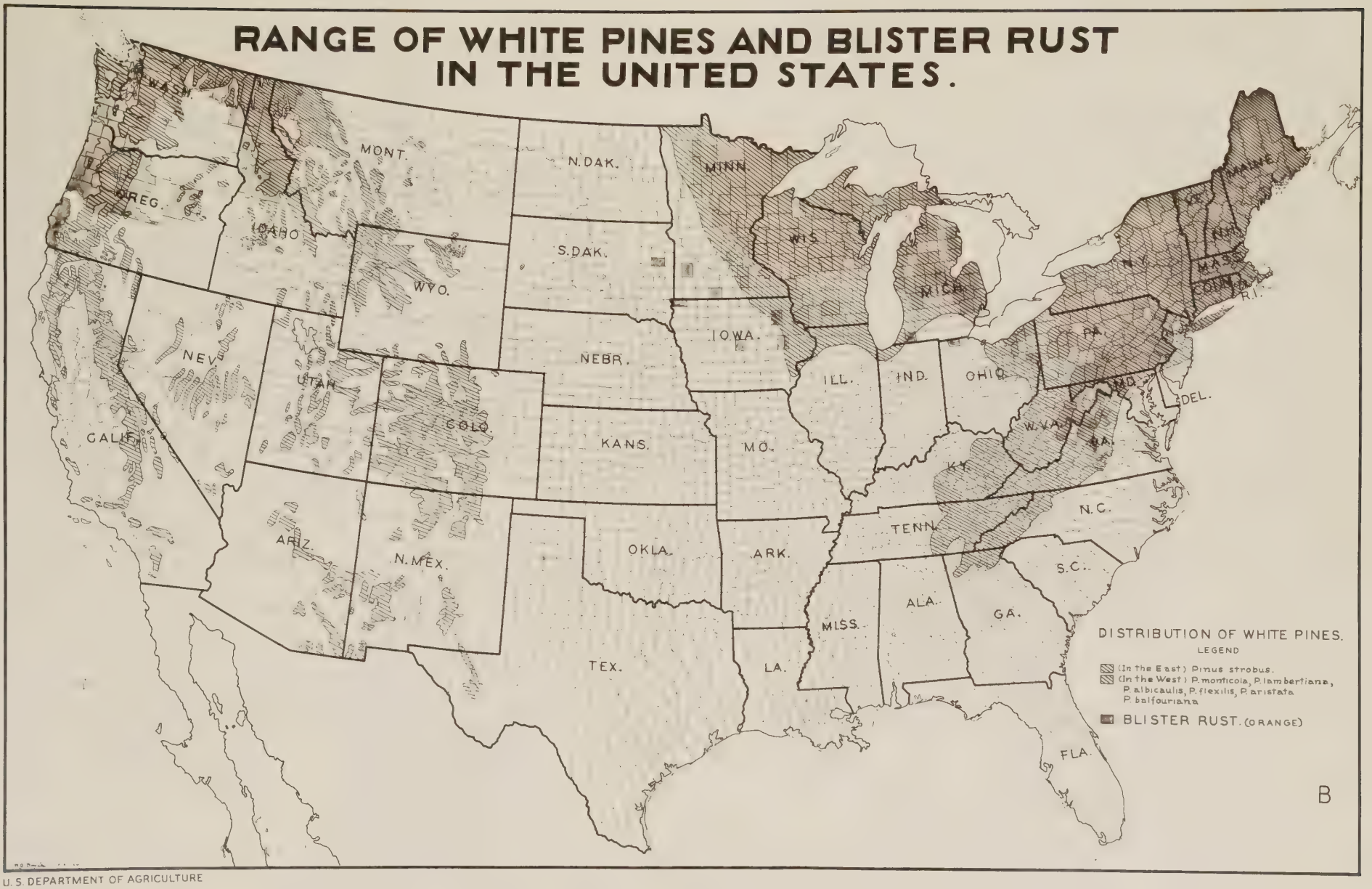
Life Cycle: The disease lives alternately on the white or 5-needled pines and on wild and cultivated currants and gooseberries, commonly called Ribes. It is communicated between host plants by wind-borne spores. It spreads from pine to Ribes for distances up to 150 miles or more, but the spread from Ribes to pines in damaging amounts is usually not over 900 feet.

(Chart C): How Blister Rust Destroys White pine.

The disease cannot spread from pine to pine, and plants other than pines and Ribes are not attacked. Therefore, control of the disease is obtained by the eradication of all Ribes within 900 feet of white pine, except in the case of especially susceptible species of Ribes or high concentrations when a wider protective zone is needed.

Damage: The white pine blister rust is an insidious disease which develops in the pines slowly but continuously. The young cankers on pine are not apparent for several years even though present in large numbers so that by the time the effect becomes distinctly apparent on the trees they are doomed. The rapidity of tree killing decreases with the size of tree but increases with the intensity of infection. The most rapid damage is done on reproduction and young growth. Larger trees, especially those which have reached merchantable size, may persist twenty or more years after infection. This, of course, is governed to a very large extent by the intensity of infection, the lightly infected trees persisting much longer

RANGE OF WHITE PINES AND BLISTER RUST IN THE UNITED STATES.



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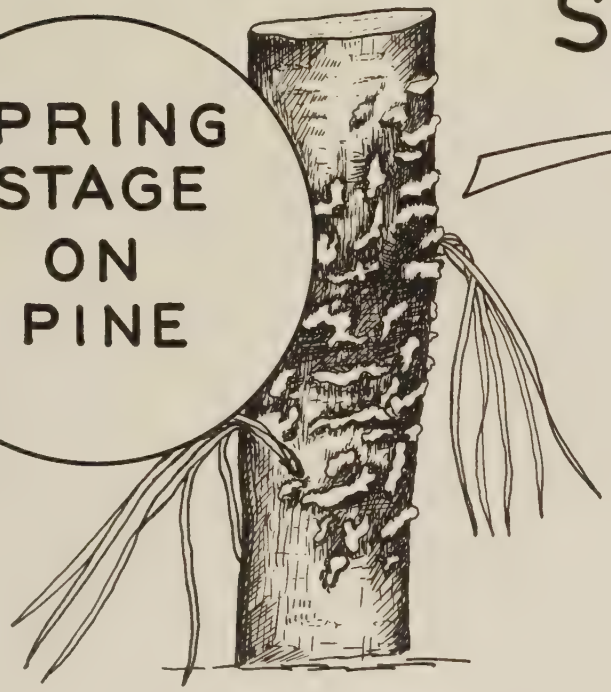
HOW BLISTER RUST SPREADS.

SPRING STAGE ON PINE



SUMMER STAGE ON CURRANT LEAF

FALL STAGE ON CURRANT LEAF

INFECTS WHITE PINES

C

than the trees of similar size which are attacked at many points. Under conditions of light infection, virgin timber or second growth pine which is ready for cutting, may escape serious damage except when such factors as market conditions and management plans for the forest delay harvesting. However, since the disease is accumulative in effect the period of time that any mature timber can stand after infection without danger of commercial loss is necessarily governed by the intensity of infection.

Blister rust is very destructive to white pines both in Europe and in this country. Moir in 1920, Spaulding in 1922, and Boyce in 1925 studied the blister rust in Great Britain, Belgium, France, Switzerland, and Denmark, and confirmed the conclusions already reached by European foresters that P. strobus is being exterminated by this disease in western Europe. Moir wrote, "The blister rust is gradually driving the white pine out of Europe. Often over 90 percent of the trees in plantations are infected and frequently one-third have been killed by the blister rust. Mature trees are also fatally attacked as shown on eastern white pine in Sweden and France, and western white pine in Scotland."

In the United States losses vary from 1 to 100 percent in local areas. The first infection area studied was at Kittery Point, Maine, where infection had reached 34 percent by the time protection was started in 1916.

Snell carried on extensive studies of the damage caused by blister rust in the Adirondack region several years ago. He studied 14,754 trees on 16 plots in different parts of the region and found an average of 35.5 percent of the trees infected. The percentage of infection on the different plots ranged from 1.5 percent to 96.2 percent. Ten and seven-tenths percent of the trees were dead, and 19.3 percent were doomed to die, making a total potential mortality of 30 percent. In 1931 Snell reported that on his Kelm Mountain plot, of the 1,130 trees on two acres, 96 percent have been infected, 69 percent are now dead, and 18 percent are doomed to die, which will make the mortality 87 percent. It was estimated that this stand, part of which was pure pine and part mixed with hardwoods, if undisturbed would have produced from 60,000 to 70,000 board feet of lumber on the two acres. Instead, this promising pine area is now actually a hardwood stand.

As a result of Doctor Snell's studies of blister rust damage in the Adirondack region he concluded that the white pine blister rust is a serious proposition on white pine land in New York, that the damage to stands under 25 years of age is high, and that the reproduction may be and usually is, entirely destroyed. His observations showed that in young trees under five years of age the proportion of dead and dying trees was 100 percent in the plots studied. This percentage was less in the case of the older trees as it takes longer for the disease to kill trees of large size owing to the distance of the needles from the trunk and the larger circumference of the trunk.

A comparison of the infection of normal pines with that of suppressed and shaded pines shows that normal dominant pines are more readily infected than the suppressed, shaded and undersized trees. For example, Snell found that 75 percent of 4,000 normal trees studied had become infected as compared with 35 percent of the smaller suppressed trees in the same plots. The fact that the disease attacks the vigorous trees more severely

results in an unsatisfactory thinning, for the best growing and most promising trees are destroyed, and the suppressed and less thrifty trees are left to compose the future stand.

The 20 to 35 years the blister rust has existed in the pine regions of the United States has not been long enough to allow it to cause widespread and spectacular damage. That stage has, of course, also been prevented by the extensive use of Ribes eradication as a control measure. Many unprotected areas, however, show how severe its attack can be when pines and Ribes are growing together or adjoining each other. Among the examples of this which have been studied in detail are the Moxie Gore plantation in Maine, with 93 percent infection on one acre; a Newbury, Vermont, area where strip lines showed over 24 percent infection and 6.4 percent dead on 134 acres; Wilton, New Hampshire, 58 percent infection with 890 cankers on 360 trees; Waterford, Vermont, 76 percent infection and 31 percent dead on 2.4 acres; Union County, Pennsylvania, two plots, 93 percent infection with an average of 51 cankers per infected tree; Pike County, Pennsylvania, one plot, 90 percent infected; Becker County, Minnesota, one plot, 22 percent infected and 9.5 percent dead; Longmeadow Creek, Idaho, in 1930 showed 75 percent to 100 percent infection on four acres, and 14 percent infection over the entire 58 acres of the stand. At this location 83 cankers in 1923 had increased to 212,840 cankers by 1930, with Ribes lacustre and viscosissimum along the trees; Garibaldi, British Columbia, three plots studied in a large area where infection originated in 1913. The pines in the plot with many Ribes were 99 percent killed by 1931. Those in the plot with adjoining Ribes were 66 percent killed by 1931, while those in the plot 100 feet from the nearest Ribes and nearly 900 feet from the Ribes concentration had 86 percent infection and 11 percent dead in 1931.

Those are of course limited areas which have been given special study and they do not represent a condition which has been reached over large extensive regions or areas. Such general conditions are best shown by strip line surveys. One of these surveys was made in Maine just a year ago (i. e. in December 1933). In this survey all pines averaging 11 feet in height were inspected on a rod-wide strip 23-1/2 miles in length and extending through three unprotected townships in eastern Maine. Twenty-seven percent of the 5,369 pines examined were found to be already fatally infected with blister rust and over 74 percent of the cankers on these trees originated since 1925. Of the known infection centers in the western white pine region, 13 originated in 1923 and these had increased to 110 centers by 1932 of which several had coalesced into a serious general infection area near Clarkia, Idaho, covering over 50,000 acres. These records give a good idea of the progress which the disease is making on unprotected areas.

CONTROL

The third primary factor in the blister rust problem is that of controlling the rust.

Methods: As already stated, control consists of destroying the currant and gooseberry plants growing in or near the pine stands.

Location of White Pine: The first step in applying control measures is to determine the location of good white pine sites of suitable extent with the requisite pine stocking to represent commercial value and then to determine from general Ribes conditions whether protection is justified. This is done by making a rapid survey (up to 2 percent) of the area. The white pine is located on maps and data taken on general Ribes conditions.

Standards of pine values: Control work is undertaken only in pine stands which meet the standard of being commercially valuable. Under these standards, an area in the Northeastern States is considered to have commercial pine value worth protecting from disease if it is covered by forest trees of which 20 percent or more are white pine.

In the Lake States, the requirement is that a stand must cover an area of 20 acres or more, and have either 200 trees per acre less than six feet in height, or 100 trees from 7 to 15 feet tall, or over 50 trees per acre more than 15 feet tall.

The standard in the southern Appalachian region is 100 trees per acre under six feet, 80 trees of from 6 to 20 feet, 50 trees of 21 to 40 feet or 35 trees over 40 feet tall.

In the Western white pine region, the standard is in general 200 pines per acre of reproduction or 20 to 35 of dominant pole size, or 5,000 board feet per acre. In the sugar pine area, the standard is based on 15 percent of the trees over 15 inches D.B.H. being sugar pine.

All these limitations refer to natural stands and are modified somewhat in considering woodlots, plantations, and shelterbelts, and also in locations where the potential value of the sites as pine-growing areas are especially high. In the case of public parks and private estates, the ornamental value of the pine is considered in each individual case.

I have given these standards in considerable detail as foresters may wish to suggest modifications of them, and such modifications would materially affect the remaining acreage considered worth protecting.

After pine of commercial value is located and recorded, the next stage is preeradication survey. This consists of a more detailed examination of the commercial white pine areas to subdivide the areas into blocks or working units, obtain data on the abundance of Ribes, topography and ground cover to determine eradicative methods to be used, locate camp sites, and determine the number of men and transportation requirements to do the job on each working unit. Areas having no Ribes are eliminated. Areas having a few scattered bushes, localized groups, or numerous bushes generally distributed are eradicated by hand methods using scouts or crews in open or close formation. Areas having dense concentrations of Ribes are eradicated by chemical or mechanical methods. Under some conditions it is frequently possible to combine the location of white pine and the preeradication survey into one operation.

Hand Methods of eradication consists of uprooting the Ribes by hand, or if too firmly rooted with a suitable grub-hoe. Each block or working

unit is systematically covered by crews consisting of three to five men and a strawboss. They locate and uproot the Ribes. String or paper trail is used to mark the eradication strips so that no ground is missed or needlessly reworked. Paper trail is used generally in the northeastern States, and string trail mostly in the other sections. These hand methods are suitable for the Eastern United States and are also used in upland types in the Western United States.

Chemical Methods are restricted to western areas having dense concentrations of Ribes where hand methods are impracticable or too expensive. They consist of killing the Ribes by treatment with chlorates or ammonium sulfocyanate. These chemicals are sprayed on top of the bushes and around the crowns and adequate quantities effectively kill the Ribes growth. This method is used in stream type in the Western white pine region which contains a dense growth of Ribes mixed with brush. This type forms only 6 to 8 percent of the acreage. Recent tests have indicated that cutting off the top and using Diesel oil or other chemicals on the crown have some advantages for use in dry sites in the West.

Mechanical Methods in so far as developed, consist of the use of a bulldozer (a tractor with special blade for uprooting brush) and thus far are restricted to areas of dense Ribes growth in the Western white pine region which are accessible to a tractor. Ribes and other brush is uprooted by the bulldozer and pushed into windrows where it is later burned. The ground is then sowed to forage grasses and the type converted from brush into a permanent meadow type. This largely prevents the reestablishment of Ribes from seeds that may germinate.

Checking: Checking consists of a systematic examination of each control area after it has been eradicated of Ribes and while the crew is still working in the vicinity. This is done by trained men who determine whether the work is of the required standard of efficiency (usually allowing not over 25 feet of Ribes live stem per acre). If the work has not been done thoroughly enought the tract is covered again and corrective measures applied.

Initial control work must usually be followed by reworking of these areas one or more times at intervals of three to fifteen years. Three such reworkings are believed to be sufficient to carry a pine stand from youth to maturity except under conditions unusually favorable for Ribes growth.

Control Costs: The labor cost of initial Ribes eradication in the Eastern United States may vary with local Ribes conditions from a few cents per acre to a dollar or more, but averages about 24 cents. The bordering protection zone sometimes means that from two to four times the pine acreage concerned must be protected. In New England the average labor cost is, as a result, about 47 cents for each acre of commercial pine for the first working and should not exceed an average of $1.25 for the three workings necessary to bring the pine stand to maturity.

In the Western white pine region the cost has varied from an average of 50 cents per acre in dense forest types to an average of $14.60 per acre in heavy-work stream-type areas with a net average of $3.62 per acre for all work up to 1932 inclusive. This includes all work performed during

the period required to develop, test and demonstrate the feasibility of control in this region. Under present conditions with comparable wage scale the initial work on all types can be done for a lower cost, with a maintenance charge of three cents to seven cents per acre per year for periodic reworkings of portions of the area where necessary throughout the white pine rotation. As will be seen later, the western white pine was covered at the rate of 3/4 of a man-day per acre during this past summer.

Control Investigations: Progress in improving present control practices and obtaining cheaper methods of Ribes eradication depends both upon research work on the fungus, and upon control investigations dealing with the ecology of Ribes and chemical and mechanical methods of destroying these plants. Control investigations which were aimed at developing better control practices, at lower costs, have been carried on as part of the control program because these activities are peculiar to this one problem and are intimately connected with the practical application of control measures and seem to fit in best with direct field operations. In order to make progress in this work it is necessary that these control investigations be continued.

Fundamental Research on the Fungus: Research on the susceptibility of the various host plants under diverse climatic condition, the development of the stages of the fungus, its effect on pines and Ribes and other fundamental investigations have been and will presumably continue to be carried on by the Division of Forest Pathology of the Bureau of Plant Industry.

Effectiveness of Control: At this point it seems appropriate to review the evidence that these control measures, as applied under field conditions, are in fact effective in preventing blister rust damage. In order to determine this point, the Division runs strip line surveys through protected and unprotected areas or studies comparable plots in the same vicinity. Such a series of studies was made in the summer of 1929 and another has been carried on in the summer of 1934.

Fortunately, it is possible to determine the year in which a pine becomes infected with blister rust with a fair degree of accuracy. Infection takes place through needles and a pine in the Eastern States usually bears its needles on any one part of a branch or twig only two to three years, the one in which that part of the twig was formed and the following year or two. Therefore, when a blister rust canker is found on part of the tree such as an internode formed in 1928 for example, we can be reasonably sure that that canker resulted from an infection which occurred either in 1928 or 1929. In the West, such determination is more complicated as the needles are held longer, but a fairly accurate dating can still be made. The cankers formed prior to about three or four years before a set of observations is made can be and are recorded. The more recent ones cannot be listed of course as a blister rust canker usually cannot be positively identified the first, second or third years after infection.

A group of charts has been prepared showing the results of these 1929 and 1934 surveys.

The first (Chart D) is a comparison of the protected and unprotected areas studied in 1934. The red line graphically represents the number of blister rust cankers developing on each hundred trees each year in the unprotected plots. It will be observed that the number kept right on increasing except for irregularities due to differing weather conditions each season, and that by 1931 those trees were developing 18 cankers on every hundred trees examined each year.

The blue line represents the trees of the protected areas. The Ribes eradication period is shown here (pointing), extending from 1923 to 1929. The number of new cankers dropped down to almost nothing after eradication.

The effect of Ribes eradication in the protected areas studied both in 1929 and in 1934 is shown in the next chart, (Chart E), where the year of Ribes eradication is shown by the vertical green line and the years before and after eradication are numbered below. It will be observed that canker formation almost entirely ceases when most of the Ribes are destroyed. These plots were given no special going over and merely represent standard routine Ribes eradication areas, studied from five to ten years after the eradication work.

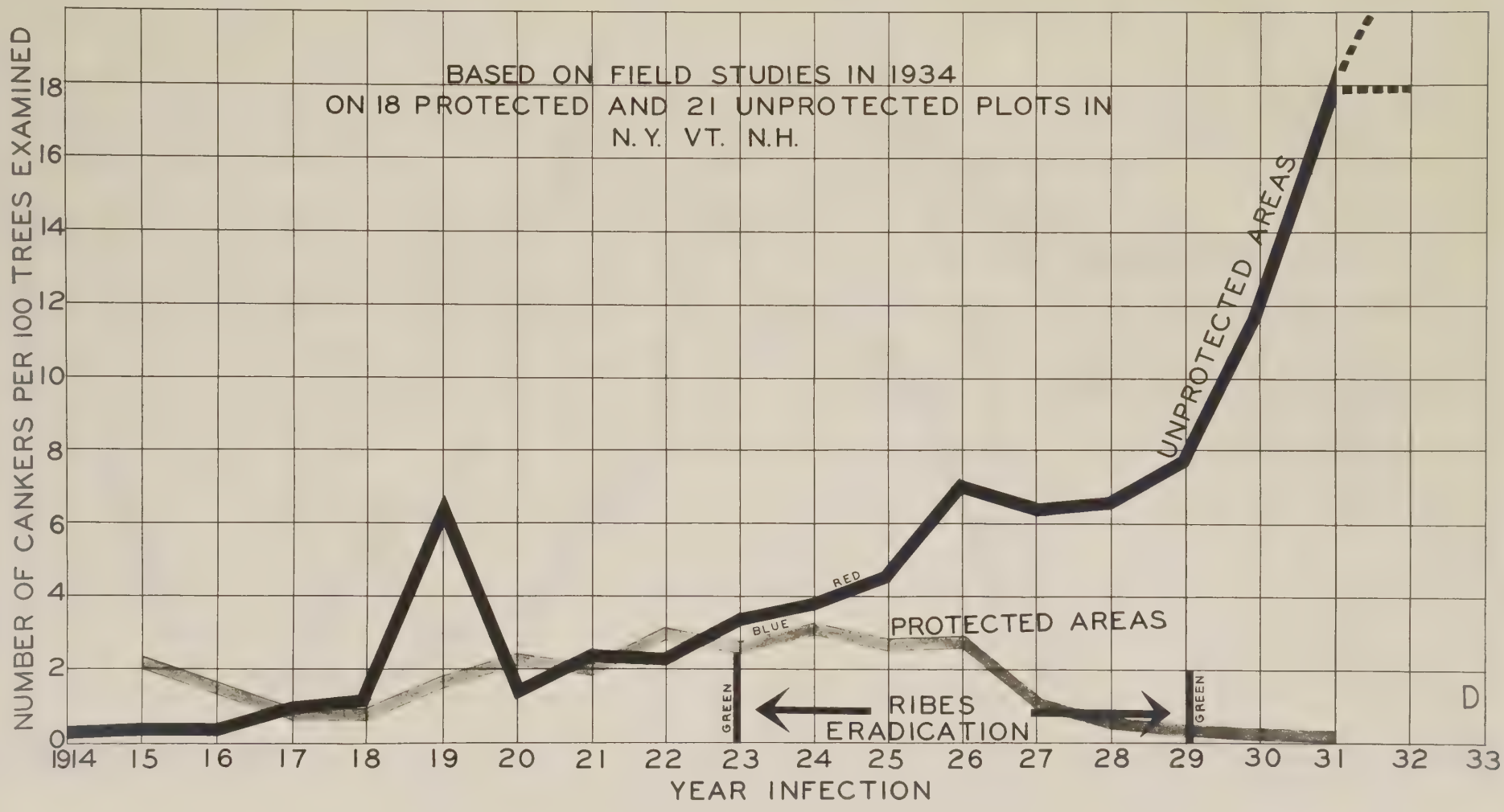
The conditions resulting in the field are indicated on this next chart, (Chart F), which shows the cumulative effect of infection, Of course Ribes eradication cannot cure the cankers already formed, and nearly all of these go on increasing in size until the tree is finally killed five to twenty-five years later. The blue lines on this chart represent the areas given Ribes eradication from 1918 to 1925 and from 1923 to 1929 respectively. The cankers kept on forming until there were about 25 cankers per one hundred trees, at which time the Ribes in the vicinity were taken out. Since then, new cankers have not been developing in the protected areas as they have in the unprotected which are represented by the red line. By the time the latter were examined there were already 70 to 85 cankers per 100 trees and they are still increasing.

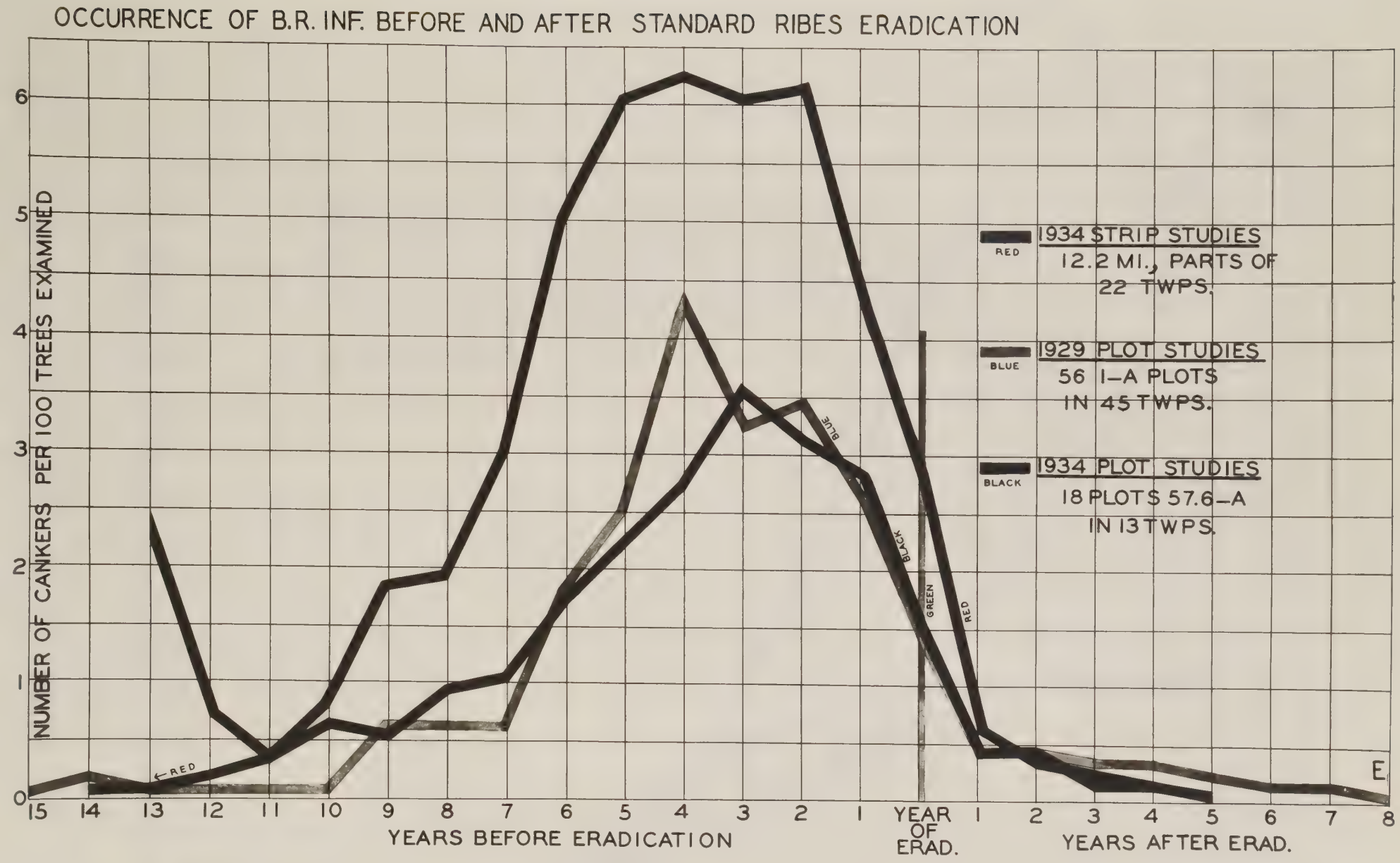
A similar cumulative chart (Chart G), shows the three series of protected areas studied in 1929 and 1934 respectively. In every case it will be seen that there was almost no production of new cankers after Ribes eradication.

Since Ribes gradually grow back to some extent in the protected areas we might expect the blue lines on Chart E to start to rise again after five to ten years. New cankers can now be found in some of the areas, covered from 1916 to 1925 on account of the regrowth of Ribes, but the study plots and strip lines did not happen to run through one of those locations where reeradication is badly needed and where it should have been carried out several years ago.

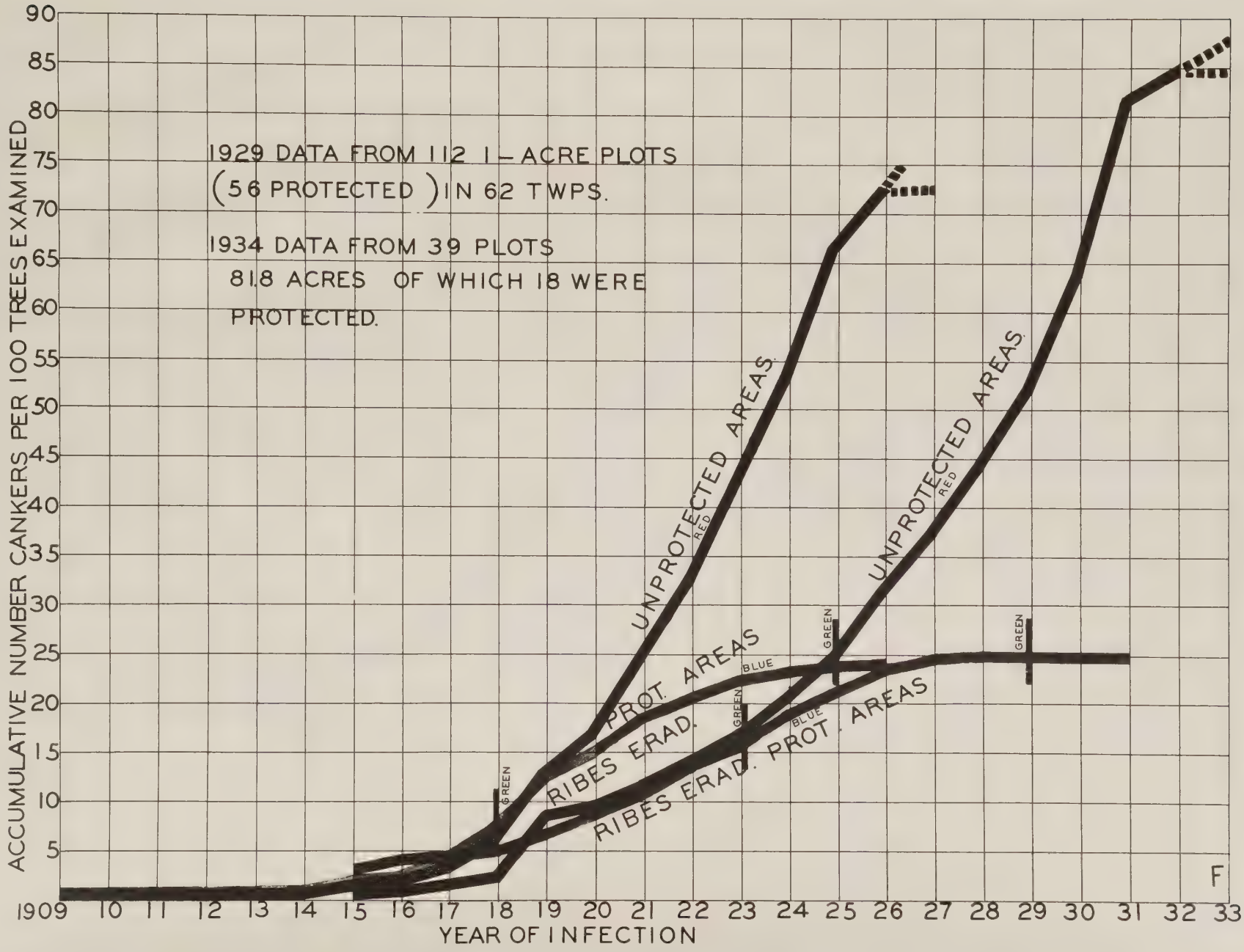
Equally conclusive results have been obtained in the Western Area. In five areas checked in Idaho in 1934 from which the Ribes had been removed between 1929 and 1931, only 6/10 of one percent of the trees show cankers developed since eradication. In four similar check areas not protected, 28 percent of the trees became infected during that period.

OCCURRENCE OF BLISTER RUST INF. IN PROTECTED AND UNPROTECTED AREAS.

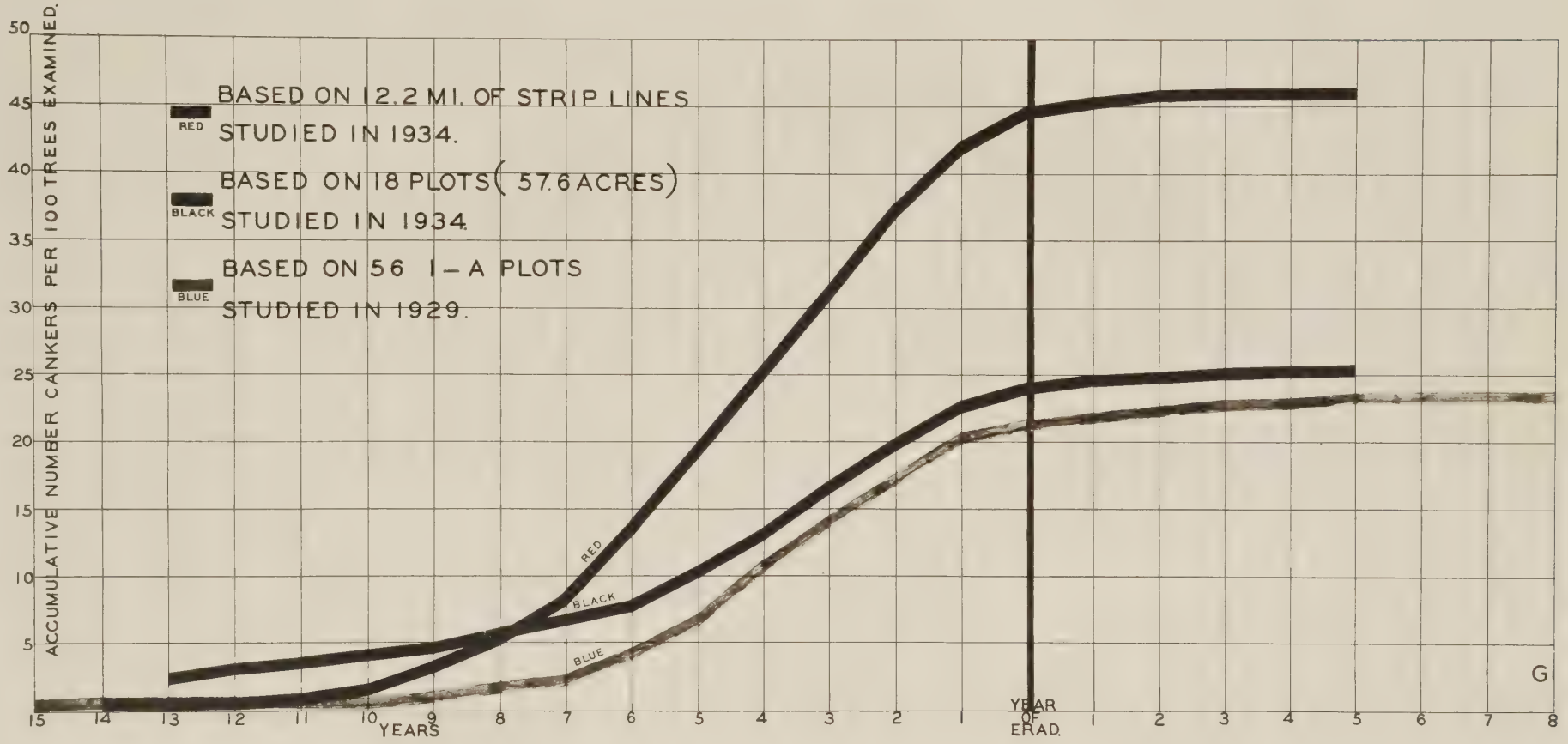



OCCURRENCE OF B.R. INF. BEFORE AND AFTER STANDARD RIBES ERADICATION
NUMBER OF CANKERS PER 100 TREES EXAMINED
0
1
2
3
4
5
6
RED
1934 STRIP STUDIES
12.2 MI., PARTS OF
22 TWPS.
BLUE
1929 PLOT STUDIES
56 1-A PLOTS
IN 45 TWPS.
BLACK
1934 PLOT STUDIES
18 PLOTS 57.6-A
IN 13 TWPS.
BLUE
BLACK
GREEN
RED
← RED
E
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
YEARS BEFORE ERADICATION
YEAR OF ERAD.
1 2 3 4 5 6 7 8
YEARS AFTER ERAD.

ACCUMULATIVE EFFECT OF BLISTER RUST INFECTION IN PROTECTED AND UNPROTECTED AREAS



ACCUMULATIVE EFFECT OF B. R. INF BEFORE & AFTER RIBES ERAD. IN 3 DIFFERENT SERIES OF PROTECTED AREAS.



Another important result of eradication is the fact that it permits the area to be naturally restocked with disease-free seedlings. Ribes eradication thus often becomes worth-while even in a stand already heavily infected in case the area is naturally reseeding. It was found at Kittery Point, Maine, for example, that after eradicating the Ribes completely from a 31-acre stand having a 34 percent infection, not only were no new cankers formed, in the sample Ribes-free plots studied four years later, but new healthy seedlings had appeared, at the rate of 60 trees per acre per year.

Pine Nurseries: Before presenting in detail the progress which has already been made in Ribes eradication in the forests of the United States, I should like to refer briefly to the protection of the 5-leaf pine planting stock in the nurseries operated by the Forest Service, the Forest and Conservation Departments of a number of States, and by private companies. To be sure that five-leaf pines will be free from blister rust at the time they leave the nursery it is necessary for them to be grown from seed in a location free from European black currants for a distance of one mile and free from other currant or gooseberry plants for a distance of 1,500 feet.

The larger pine-growing nurseries are established in the white pine region and under national conditions are more or less surrounded by cultivated or wild currant and gooseberry plants. A very much higher degree of efficiency is required in the removal of the Ribes around such nurseries than is needed in the case of the protection of forest stands, both because there are so many young trees concentrated in a small area in the nursery and because any nursery trees which become infected may carry blister rust into new sections when they are shipped out.

Most of the larger pine-growing nurseries in the United States have by this time received a certain amount of protection against blister rust by the eradication of Ribes in their vicinity. Those which ship 5-leaf pines interstate are required to obtain federal pine-shipping permits before making such shipments, and very careful intensive inspections of the environs of such nurseries are made before such permits are issued. For the summer of 1934, the Division received applications from 42 nurseries whose owners desired to make such interstate shipments, and permits were issued to 25. Many of the other 17 have already brought their premises into satisfactory condition, but do not yet happen to have protected pines large enough for sale. The applications indicate that 11,161,850 five-leaf pines were growing in 1934 in those protected nurseries which make interstate shipments, and that the owners or operators of such nurseries are planning to increase that number to over 18,500,000 in the immediate future.

These figures include the Federal Forest Service nurseries, some of which have been established only during the past few months, but in most cases they do not include the State pine-growing nurseries, since such nurseries usually do not ship interstate and do not require federal permits.

PROGRESS

The progress of blister rust control from 1918 to 1934 in the United States is indicated on this chart (Chart GG). As stated previously, there are 14,200,000 acres of commercially important white pine in the United States. The surrounding protective zones increase this to nearly 24,800,000 acres, the area on which control is needed. Of that amount approximately 12,600,000 acres have been initially eradicated of Ribes. As shown by the blue line about 1,600,000 acres have been reworked. Steady progress was made up to 1933 and a sharp increase in production took place in 1934. Of the total control area worked, 4,187,567 acres were covered in 1933 and 1934. This increase is partly due to the availability of additional labor from the C.C.C. and the use of Public Works Allotments, and partly to a large acreage worked in the Southern Appalachian Region where scarcity of Ribes made possible the extensive use of scouting methods.

This chart does not include the work performed in connection with the removal of cultivated European black currants in the white pine regions. This work has been completed in the Western white and sugar pine region and is underway in several States in the Eastern white pine regions. In this work 314,542 cultivated black currants have been eradicated as a general control measure.

Eastern United States

Commercial White Pine Area: In the Eastern United States commercial areas of white pine are shown on this map (H). The solid green color indicates the counties in which white pine occurs in commercial quantities and the green spots indicate counties containing scattered stands of native or planted white pine with commercial value.

Distribution of Infection: On this map (I) the orange color indicates the distribution of blister rust by counties in which it has been found. The disease has been present in the Northeastern States longer than in other parts of the country and infection occurs generally on both host plants. Within the past three years, the rust has been discovered advancing southward into the Southern Appalachian States. Several centers of infection have been found in Maryland, Virginia and West Virginia, the most southern point being Nelson County, Virginia. The infection centers show a gradual extension of the rust southward into the white pine areas of the Appalachian Mountains.

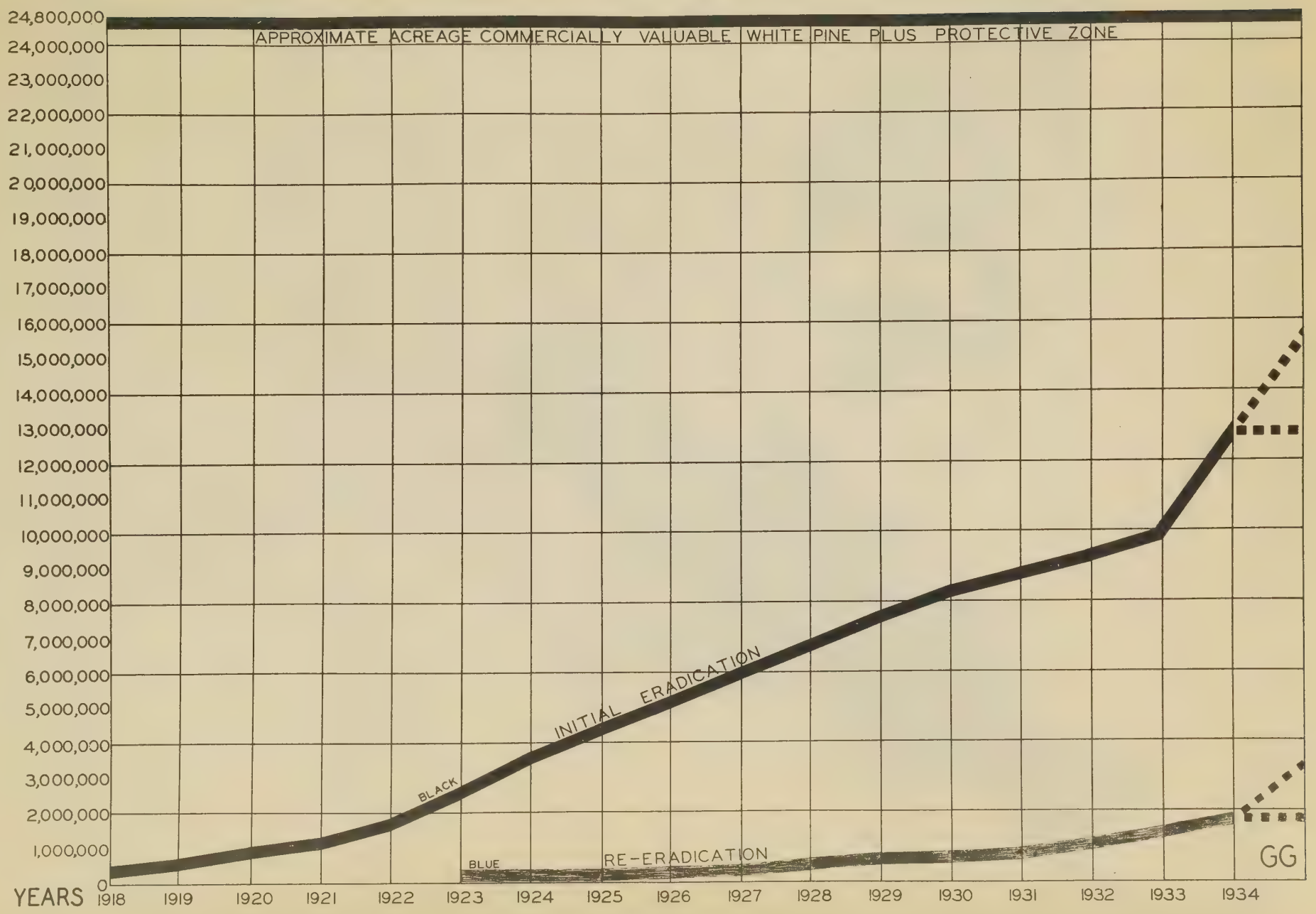
The rust was found in the Lake States in 1916 and since that time has gradually spread throughout the commercial white pine area, being particularly abundant in the northern portion of the three Lake States. It has also been found in a few places on both host plants in Ohio and Iowa.

Progress of Control

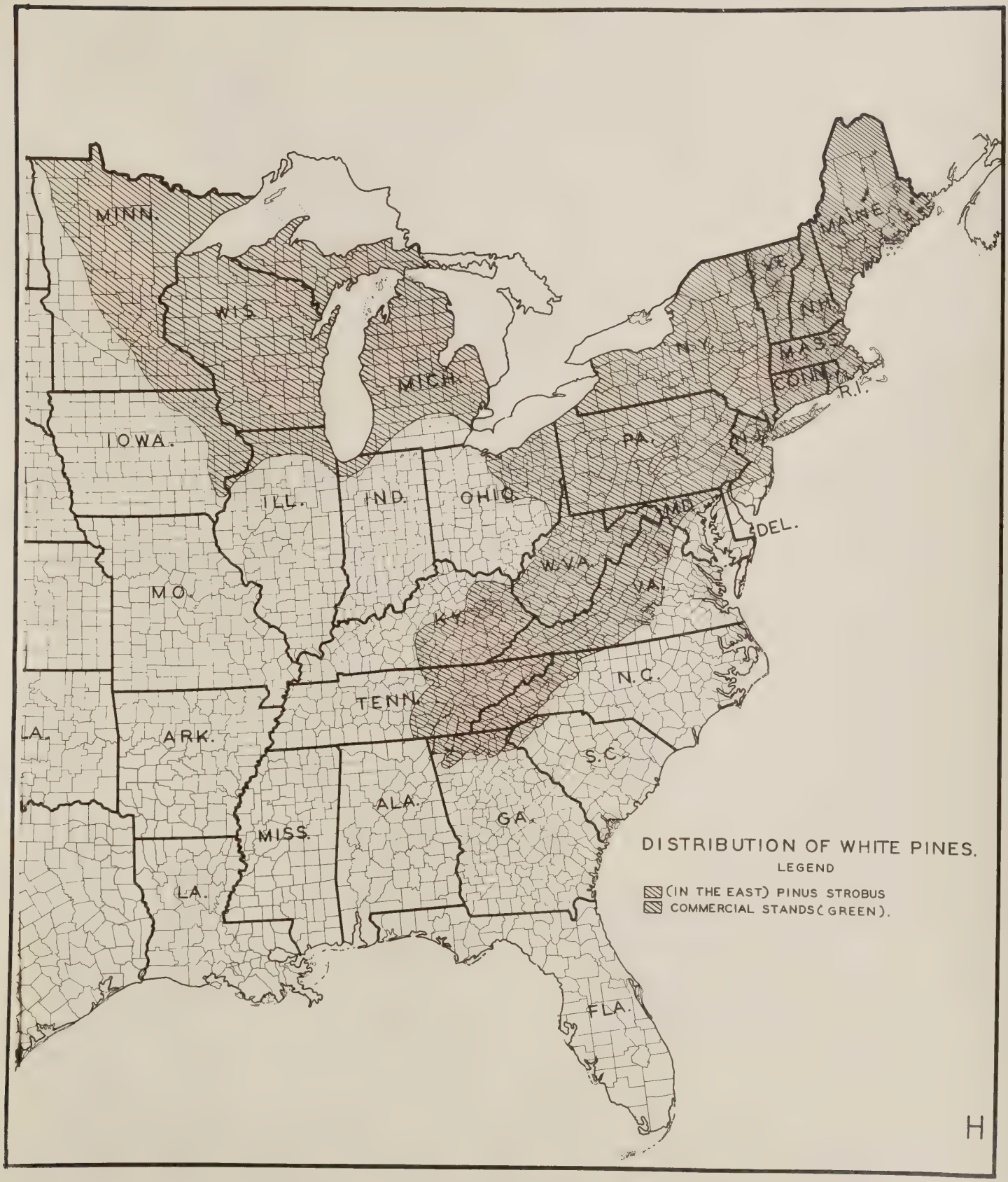
Northeastern States

The progress of control work in the Northeastern States is shown graphically by this chart (J), which gives the status of Ribes eradication by States up to and including 1934. Practically all of the white pine in

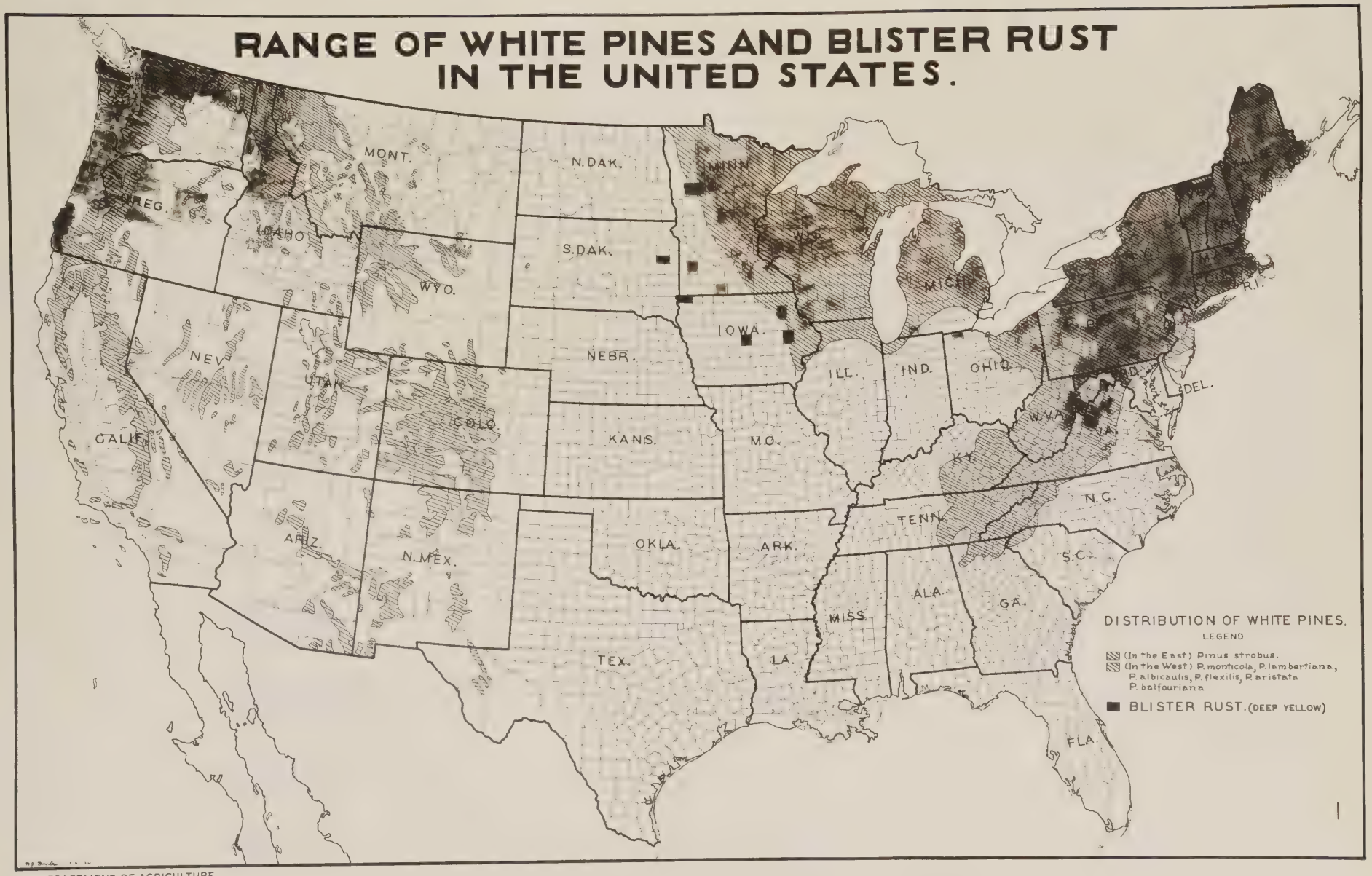
PROGRESS IN BLISTER RUST CONTROL
1918–1934



COMMERCIAL DISTRIBUTION OF E. W PINES.

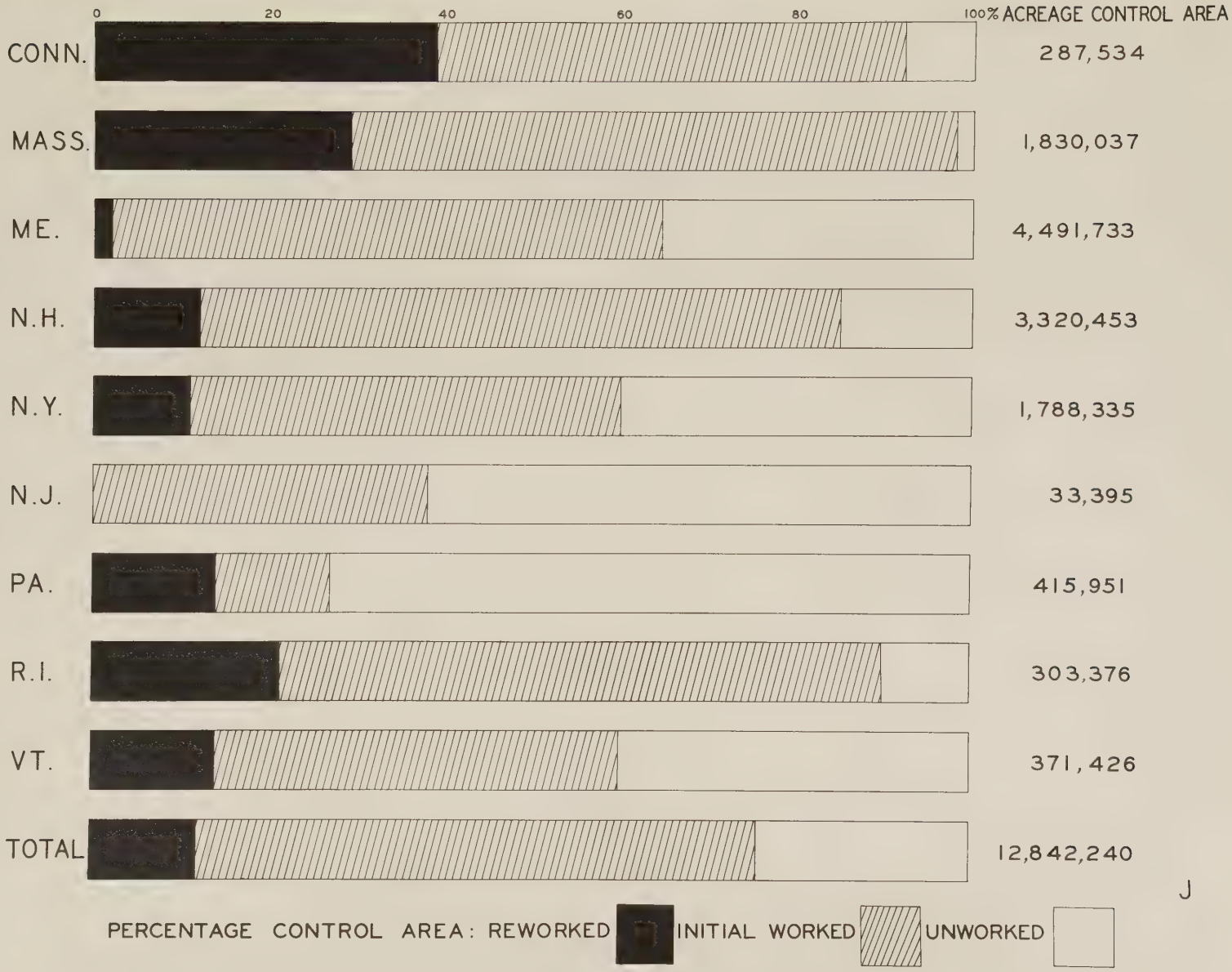


RANGE OF WHITE PINES AND BLISTER RUST IN THE UNITED STATES.



U.S. DEPARTMENT OF AGRICULTURE

STATUS RIBES ERADICATION
NORTHEASTERN STATES 1934



J

these States is in private and State ownership. The bars represent the total acreage of the control area (white pine acreage plus protective zones) for each State, the acreage being shown on the right. The black portion indicates the percentage of the total area that has been reworked, the cross hatch the percentage that has been given initial eradication and the blank portion the percentage that has not yet been worked. It should be noted that about 76 percent of the total control area of 12,842,240 acres has been given initial protection and 24 percent remains to be worked, while only 12 percent has been reworked.

Southern Appalachian States

This chart (K) shows the progress of control work in the Southern Appalachian States by ownership classes, the left column represents the total control area of 5,353,500 acres of which 32 percent is in Federal ownership as indicated by the middle column, and 68 percent in State and private ownership as indicated by the column to the right. The cross hatch shows that 20.4 percent of the total acreage, 6.9 percent of the Federally owned acreage and 26.7 percent of the State and privately owned acreage has been given initial protection.

Lake States

This chart (L) shows the progress of control work in the Lake States, the total control area of 1,692,585 acres is represented by the column at the left. Of this acreage 1,433,208 acres or 85.9 percent is in State and private ownership as indicated by the middle column and 259,377 acres is in Federal ownership as shown by the column to the right. Initial protection as shown by cross hatch has been given to 41.9 percent of the Federal, 42.5 percent of the State and private, and 42.4 percent of the total acreage.

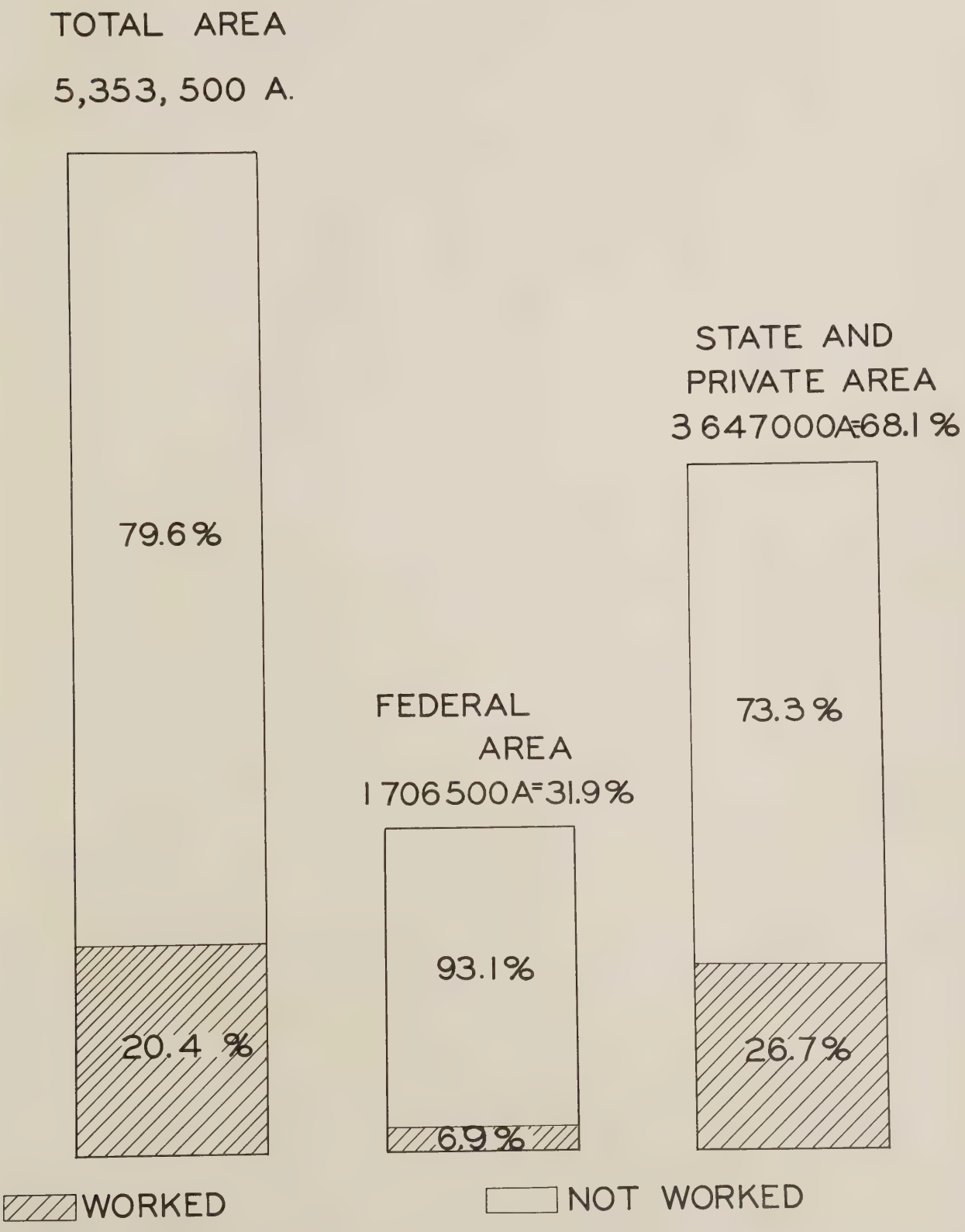
Western White Pine

In the West, there are two species of 5-leaf pines of commercial importance: Western white pine (Pinus monticola) and sugar pine (P. lambertiana). The commercial stands of the former occur largely in the so-called Inland Empire, consisting of the northern half of Idaho as well as Eastern Washington and western Montana. The principal stands of sugar pine are in the Sierra Nevada mountains of California, extending northward into southern Oregon. Both of these species of pine extend into the Douglas fir area of the Cascade Range, but scarcely in commercial amounts.

There are five additional species of 5-leaf pines in the Western region, having some economic importance from the standpoint of watershed protection and having certain recreational values, but which have not thus far been considered of sufficient economic or commercial importance to justify the cost of their protection from the blister rust, at least in advance of the arrival of the disease in the area in which they grow. These are limber pine (P. flexilis) white bark pine (P. albicaulis)Mexican white pine (P. strobiformis) bristle-cone pine (P. aristata) and foxtail pine (P. balfouriana).

Taking up first western white pine in the Inland Empire region, it has been found that there are 2,710,129 acres of western white pine in the Inland Empire territory having sufficient commercial importance to justify protective

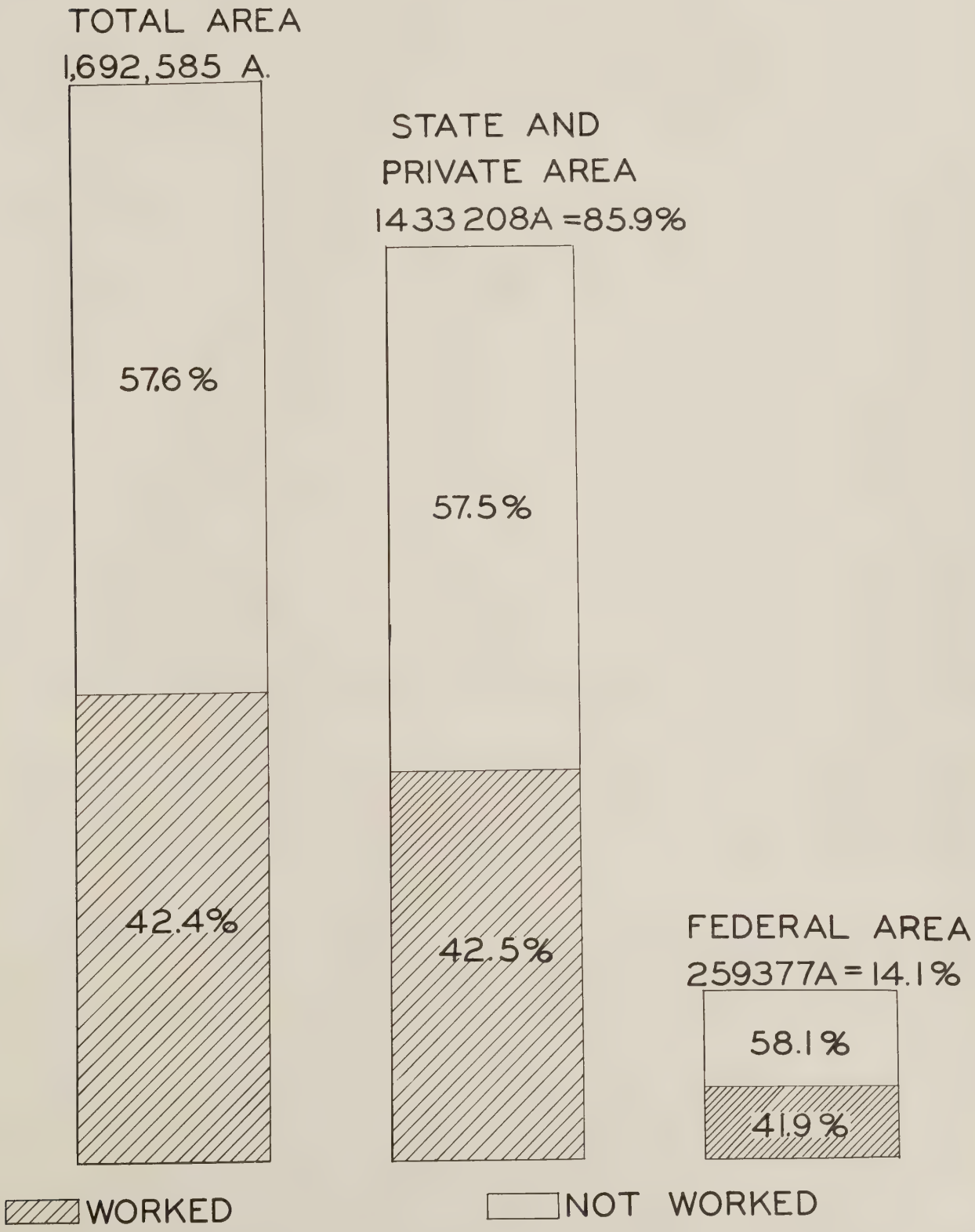
CONTROL AREA AND PROGRESS OF CONTROL WORK IN SO. APPALACHIAN STATES 1928 - 1934



K

Roy G. Pierce
1934-11-30

CONTROL AREA AND PROGRESS OF CONTROL WORK IN THE NORTH CENTRAL STATES



L

work. The distribution of this pine is shown in the type map (Map M) the shaded areas indicating the outlines of the white pine distribution area while the green sections represent the commercial white pine stands.

This next map (Map N) shows the ownership of the commercial area, the National Forests and other sections under the control of the Forest Service being indicated by green, the Public Domain by blue, and other publicly owned land such as State and county by brown and orange, and privately owned lands are shown in red and purple and yellow.

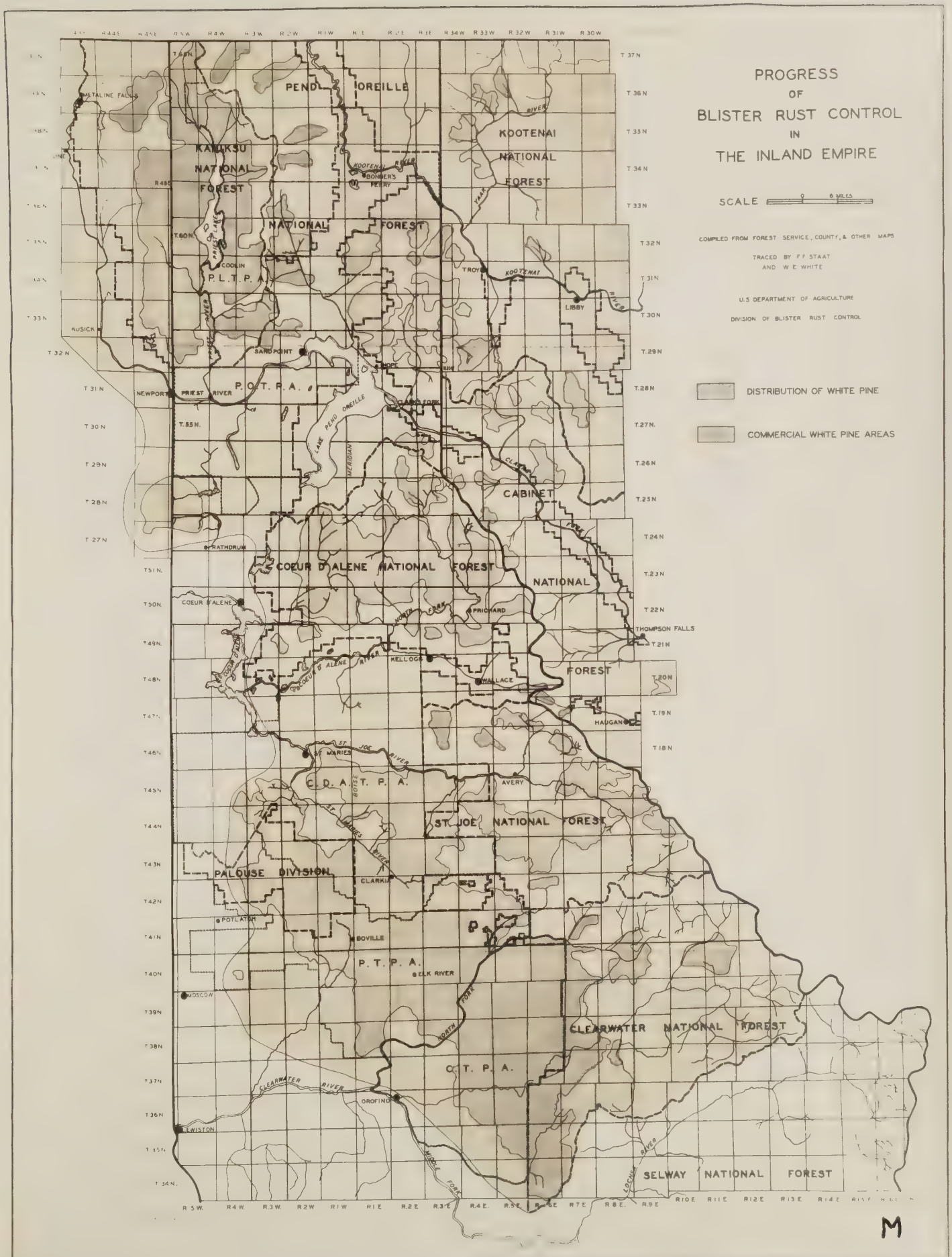
The condition on these areas will immediately show that land ownership is so mixed in the white pine type of north Idaho as to preclude the possibility of control of blister rust unless all land ownership is considered in the control program. The only possible exception to this statement is the case of Forest Service lands on the Clearwater National Forest, the Coeur d'Alene National Forests, parts of the Kaniksu National Forest, and on a number of areas on the Kootenai and Cabinet National Forests. The prosecution of a control program by the Forest Service alone on the St. Joe National Forest, however, would, as this map indicates, be a practical impossibility over most of the area concerned. The land ownership within the control areas is further complicated by the status of tax delinquent lands. A total of 464,124 acres of commercial white pine land in this region are tax delinquent from one to seven years. Undoubtedly some of this land will revert to Federal ownership.

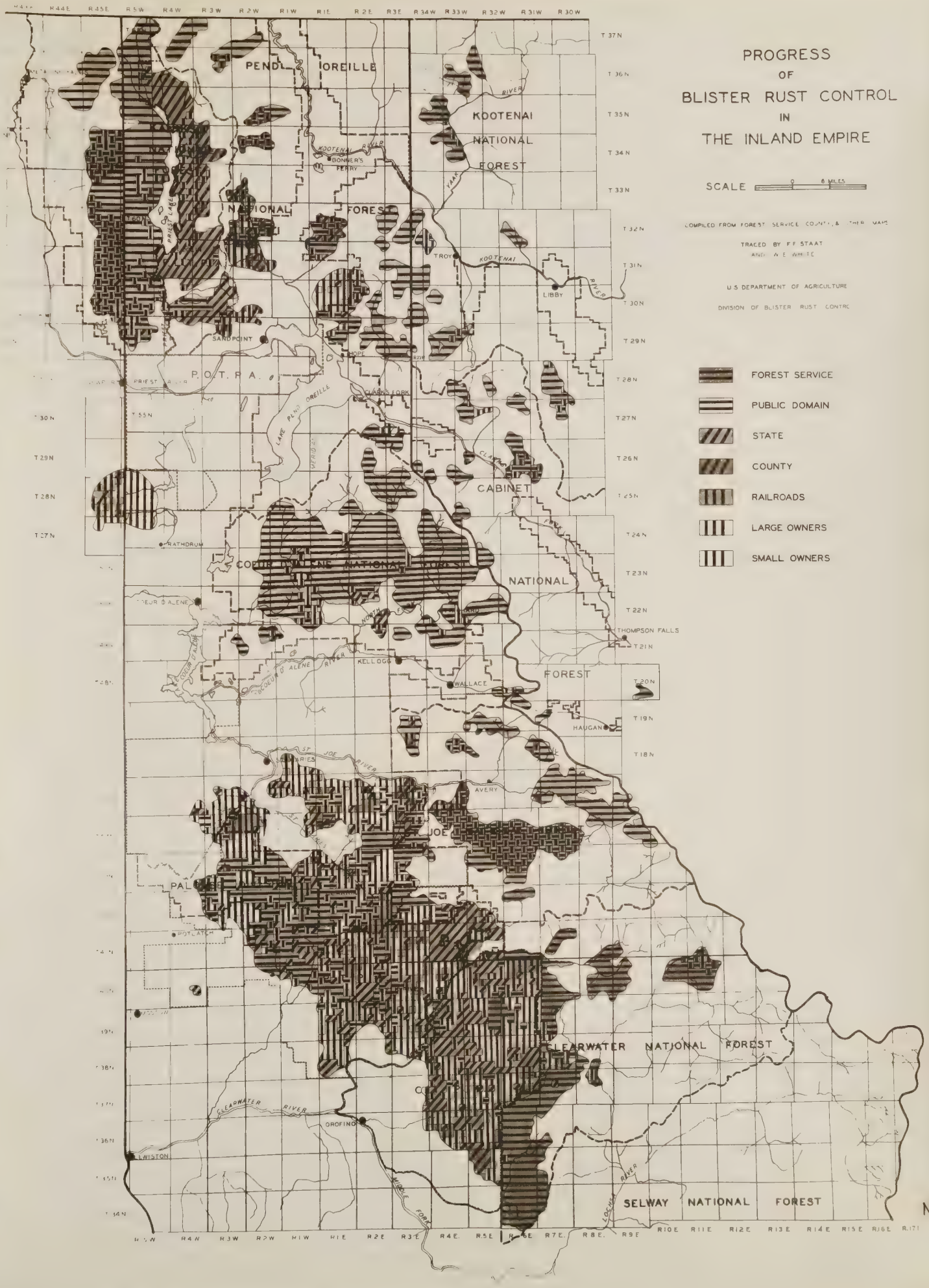
The next chart (Chart O) illustrates the proportion of the commercial pine areas owned by these various agencies. The left-hand bar represents the total area of the commercial stands. It will be seen that about half of this area, namely 1,343,874 acres, is National Forest land. The States concerned own 367,003 acres, while large and small owners and the railroads own 919,873 acres, the small balance being represented by county-owned lands (40,449 acres) and the Public Domain (38,930 acres).

The white pine blister rust has been established in this region since about 1923, although it was not discovered until 1927. Western white pine has proven unusually susceptible and at each point at which the blister rust has become established it has rapidly developed to a point where it was causing severe damage.

The next map (Map P) shows the location of the pine infection centers which have thus far been discovered in the region. Attention is called particularly to the situation in the Coeur d'Alene and St. Joe National Forests and to the numerous infections in the privately owned areas just west of the Clearwater and St. Joe National Forests.

From the time infections in the West were first discovered, it has been recognized that the situation in the western white pine belt offered particular difficulties on account of the inaccessibility and rugged nature of a major part of the territory and the heavy concentrations of Ribes growing along streams. Further acquaintance with the pine growing areas has resulted in dividing them into four types in two of which, namely types 1 and 4 (Chart Q), the Ribes are vigorously growing and increasing in num-

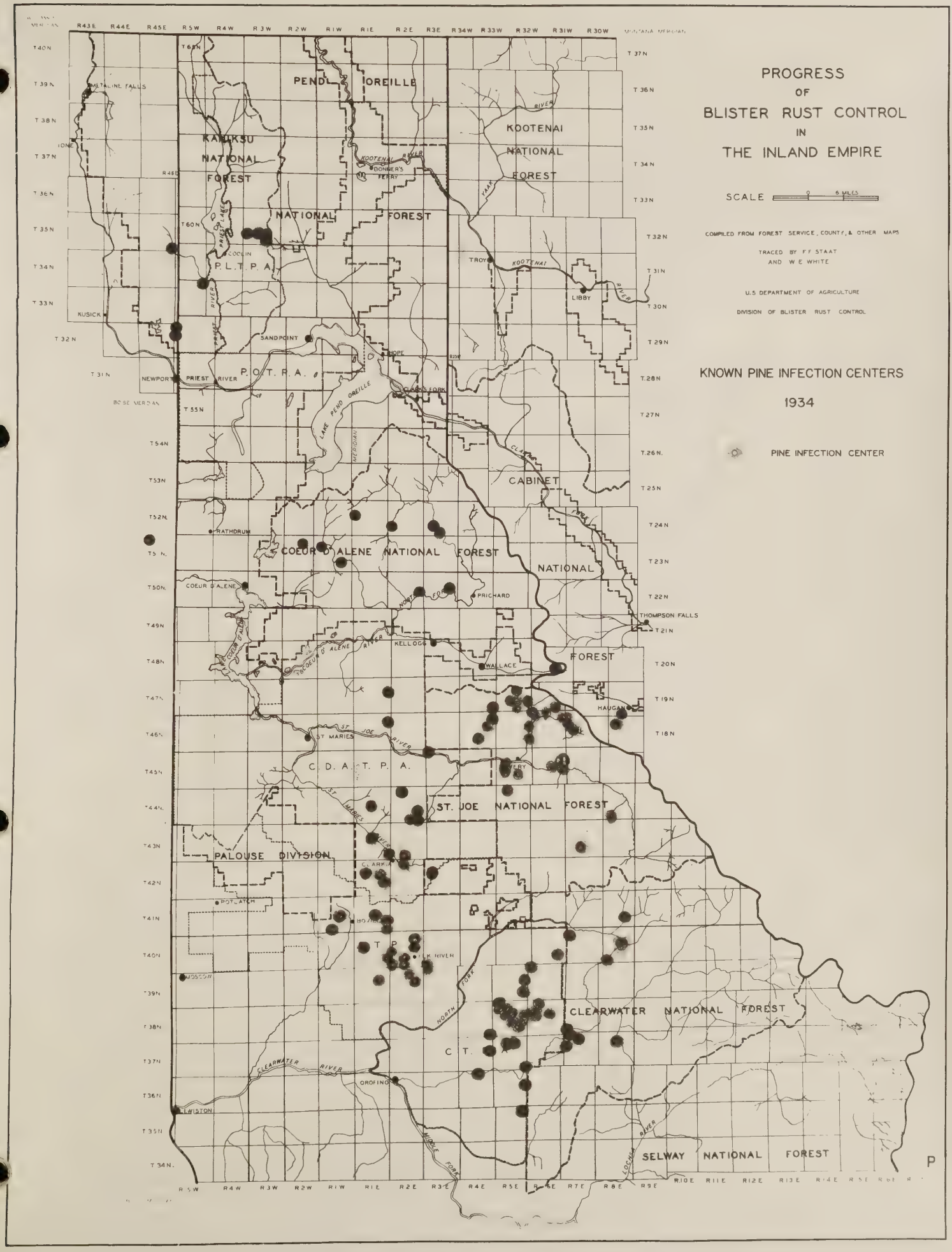

PROGRESS
OF
BLISTER RUST CONTROL
IN
THE INLAND EMPIRE
SCALE
0 6 MILES
COMPILED FROM FOREST SERVICE, COUNTY, & OTHER MAPS
TRACED BY F.F. STAAT
AND W.E. WHITE
U.S DEPARTMENT OF AGRICULTURE
DIVISION OF BLISTER RUST CONTROL
DISTRIBUTION OF WHITE PINE
COMMERCIAL WHITE PINE AREAS
PEND OREILLE
KOOTENAI
NATIONAL
FOREST
KANIKSU
NATIONAL
FOREST
NATIONAL FOREST
P.L.T.P.A.
P.O.T.P.A.
CABINET
COEUR D'ALENE NATIONAL FOREST
NATIONAL
FOREST
C.D.A.T.P.A.
ST. JOE NATIONAL FOREST
PALOUSE DIVISION
P.T.P.A.
C.T.P.A.
CLEARWATER NATIONAL FOREST
SELWAY NATIONAL FOREST
METALINE FALLS
BONNER'S FERRY
TROY
LIBBY
KOOTENAI RIVER
KAMA RIVER
PRIEST LAKE
COOLIN
SANDPOINT
NEWPORT
PRIEST RIVER
LAKE PEND OREILLE
CLARK FORK
RATHDRUM
COEUR D'ALENE
PRICHARD
NORTH FORK
THOMPSON FALLS
KELLOGG
COEUR D'ALENE RIVER
WALLACE
HAUGAN
ST. MARIES
ST. JOE RIVER
AVERY
ST. MARIES RIVER
CLARKIA
POTLATCH
BOVILLE
ELK RIVER
MOSCOW
NORTH FORK
CLEARWATER RIVER
OROFINO
LEWISTON
SNAKE RIVER
LOCHSA RIVER
M


PROGRESS
OF
BLISTER RUST CONTROL
IN
THE INLAND EMPIRE
SCALE
0 8 MILES
COMPILED FROM FOREST SERVICE COUNTY & THEIR MAPS
TRACED BY F.F. STAAT
AND A.E. WHITE
U.S. DEPARTMENT OF AGRICULTURE
DIVISION OF BLISTER RUST CONTROL
FOREST SERVICE
PUBLIC DOMAIN
STATE
COUNTY
RAILROADS
LARGE OWNERS
SMALL OWNERS
PEND OREILLE
KOOTENAI
NATIONAL
FOREST
BONNER'S FERRY
SANDPOINT
TROY
LIBBY
P.O.T.R.A.
CABINET
NATIONAL
FOREST
COEUR D'ALENE NATIONAL FOREST
RATHDRUM
COEUR D'ALENE
KELLOGG
WALLACE
THOMPSON FALLS
HAUGAN
AVERY
POTLATCH
CLEARWATER NATIONAL FOREST
OROFINO
LEWISTON
SELWAY NATIONAL FOREST
N

~~CHART 3~~
O

LAND OWNERSHIP WITHIN CONTROL AREAS

INLAND EMPIRE


PROGRESS
OF
BLISTER RUST CONTROL
IN
THE INLAND EMPIRE
SCALE 0 6 MILES
COMPILED FROM FOREST SERVICE, COUNTY, & OTHER MAPS
TRACED BY F F STAAT
AND W E WHITE
U.S DEPARTMENT OF AGRICULTURE
DIVISION OF BLISTER RUST CONTROL
KNOWN PINE INFECTION CENTERS
1934
PINE INFECTION CENTER
PEND OREILLE
KANIKSU
NATIONAL
FOREST
KOOTENAI
NATIONAL
FOREST
P.L.T.P.A.
P.O.T.R.A.
CABINET
COEUR D'ALENE NATIONAL FOREST
NATIONAL
FOREST
C.D.A.T.P.A.
ST. JOE NATIONAL FOREST
PALOUSE DIVISION
CLEARWATER NATIONAL FOREST
SELWAY NATIONAL FOREST
C T.
T P
P
SANDPOINT
PRIEST RIVER
NEWPORT
HOPE
CLARK FORK
TROY
LIBBY
KOOTENAI RIVER
BONNER'S FERRY
COEUR D'ALENE
PRICHARD
WALLACE
KELLOGG
ST MARIES
ST. JOE RIVER
POTLATCH
MOSCOW
LEWISTON
OROFINO
CLEARWATER RIVER
THOMPSON FALLS
HAUGAN
COLVILLE
KUSICK
RATHDRUM
BOISE MERIDIAN
MONTANA MERIDIAN

ber on account of the favorable conditions including relatively open growth or an adequate supply of water, type 1 being relatively open country from recent burns, and type four being the stream type. In types two and three, the forest cover is of such a nature that the Ribes are either not increasing or are decreasing in numbers, although they are numerous enough so that they are responsible for considerable rust spread. The differences between these four groups are especially important from the standpoint of the ultimate amount of work which will have to be done, since types one and four in order to protect the pine adequately will have to be covered several times at intervals of comparatively few years, while one working with a partial second a number of years later are generally sufficient to place types two and three on a low cost maintenance basis.

The progress of the work on each of the classes of land is shown (Chart Q). Attention is particularly called to the stream type (type 4) of which there are only 171,394 acres in the entire area. About two-thirds of this type (95,481 acres) have already been worked. In spite of the small size of the area it represents the most dangerous type since the Ribes grow so vigorously and the Ribes species concerned are unusually highly susceptible to rust and produce an enormous quantity of spores. The next most important type is type one, of which there are 1,089,345 acres in the area. Only about one-third (356,155 acres) of this type has been covered. The bar at the left shows the general situation throughout all the commercial white pine stands of the Inland Empire. Of the entire 2,710,129 acres slightly more than one-third has been covered by this time (1,076,323 acres).

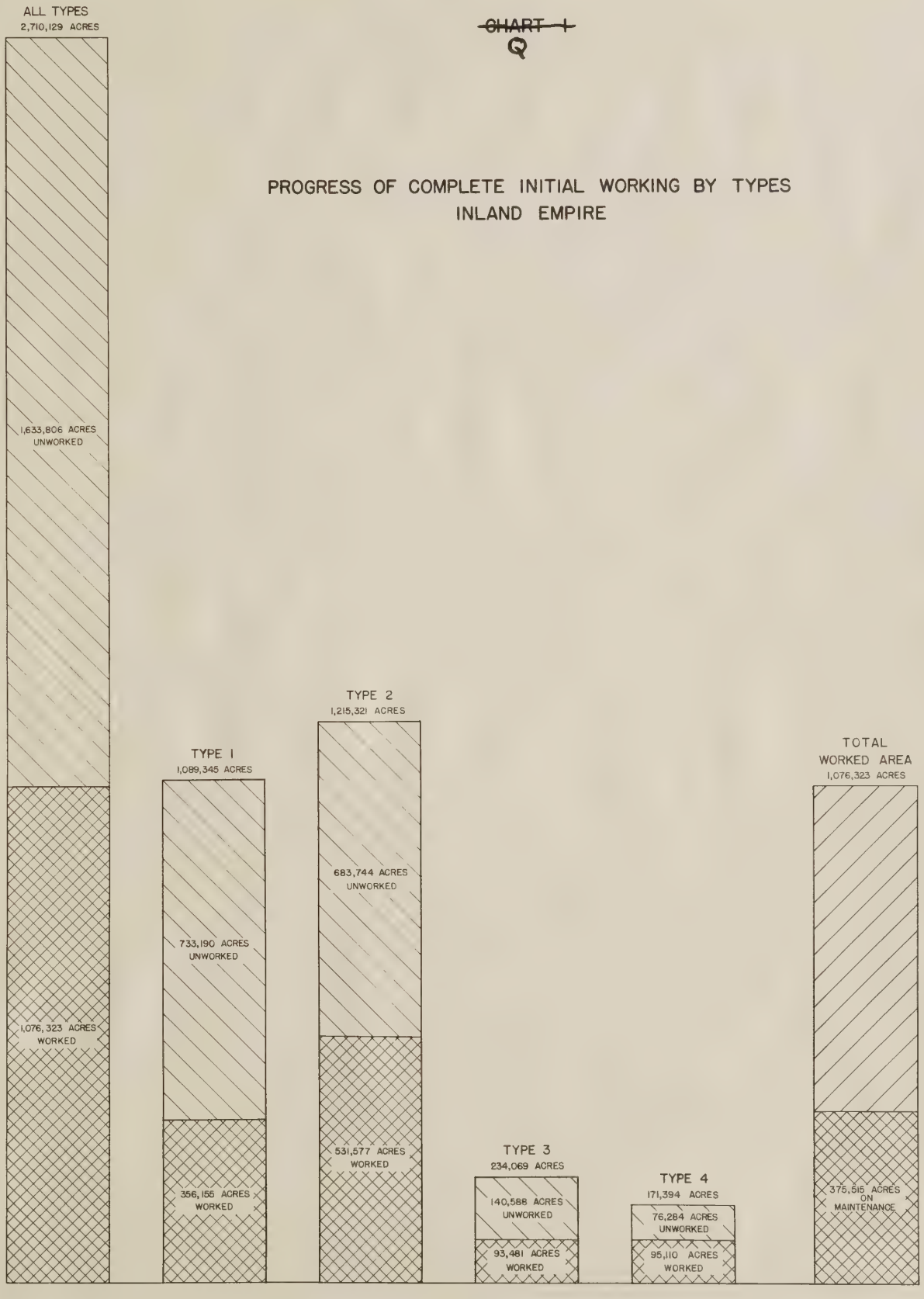
The next chart (Chart R) shows the progress of the work by land ownership classes. Of the 1,382,804 acres under Federal ownership and jurisdiction, somewhat less than half, namely 646,733 acres have been covered.

The acres in which this work has been done are shown on this map (Map S). Only the stream-type sections have been covered in the areas shown in yellow. Initial working of the entire woodland has been carried on over the area marked green and the small section shown in blue has been worked the second time. The unworked areas bearing commercial stands are shown in brown.

Recently a careful analysis has been made of the work which remains to be done in the Western white pine territory from the standpoint both of man-hours and of acres. During 1934, 3,786,640 man-hours have been used in the coverage of 672,092 acres. It is found that a continuation of about the same program for the next three years would result in covering the entire area the first time, and would make it possible to cover a second time about two-thirds of the area which had already been covered once, and which is most pressing on account of the vigor of the Ribes growth. It would then be possible to drop the program to about one-third of its present size for several years. The territory would then be on a maintenance basis which would probably needno more than about 1/20 of the present number of man-hours to maintain in a satisfactory condition for the future maintenance of the western white pine in a disease-free condition.

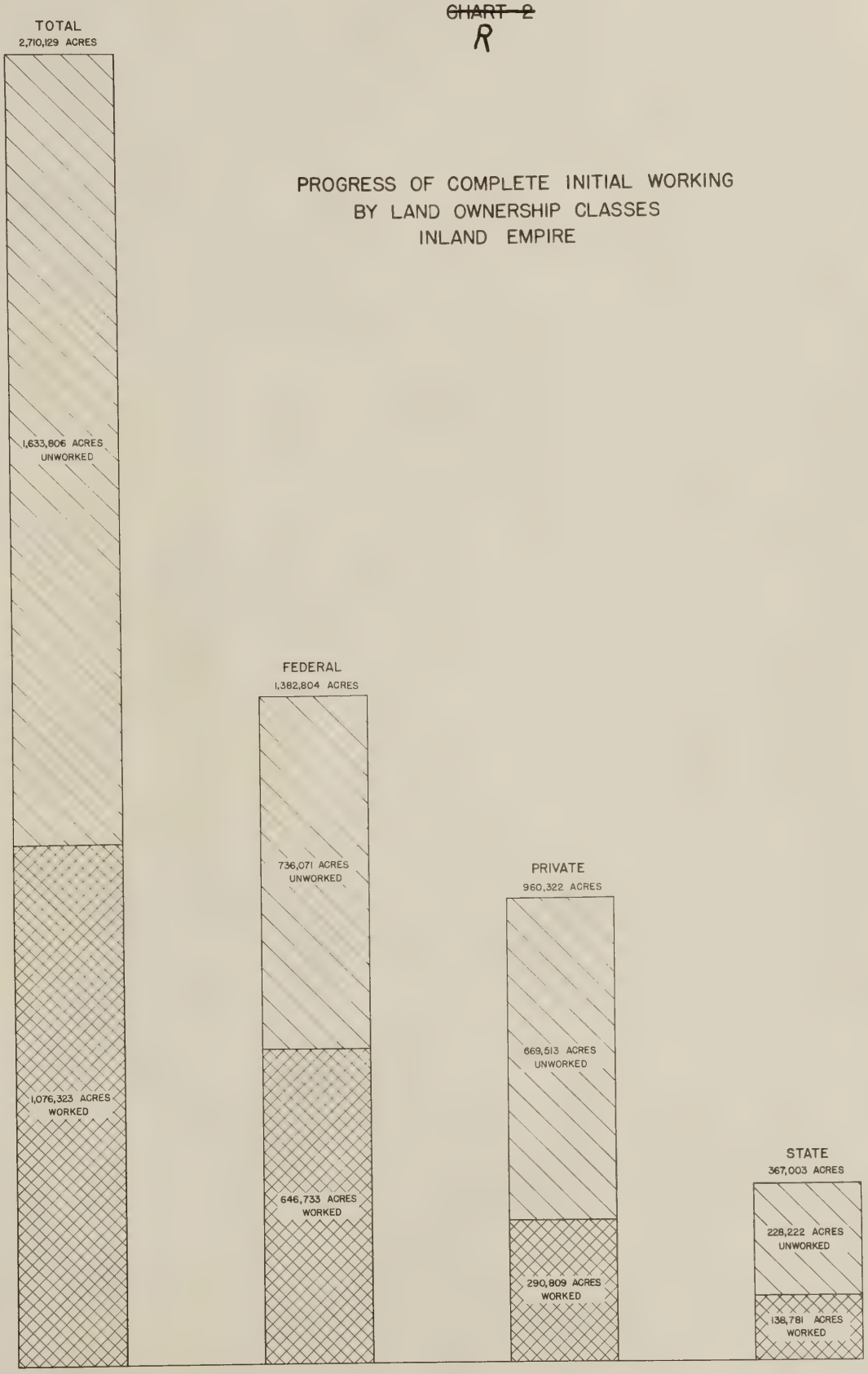
~~CHART 1~~
Q

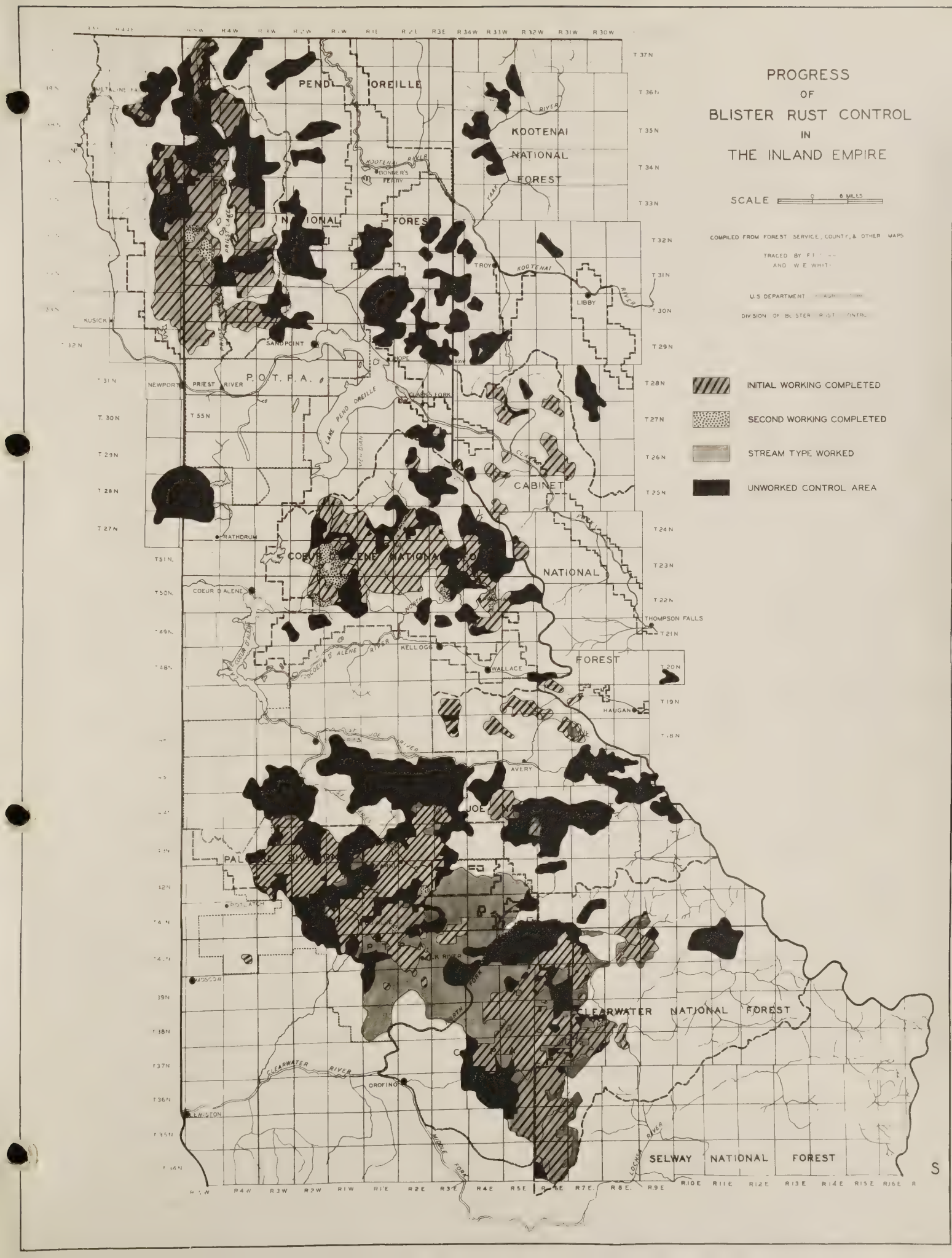
PROGRESS OF COMPLETE INITIAL WORKING BY TYPES
INLAND EMPIRE



~~CHART 2~~
R

PROGRESS OF COMPLETE INITIAL WORKING
BY LAND OWNERSHIP CLASSES
INLAND EMPIRE




PROGRESS
OF
BLISTER RUST CONTROL
IN
THE INLAND EMPIRE
SCALE
0
6 MILES
COMPILED FROM FOREST SERVICE, COUNTY, & OTHER MAPS
TRACED BY F
AND W E WHIT
U.S DEPARTMENT
DIVISION OF BLISTER RUST CONTRO
INITIAL WORKING COMPLETED
SECOND WORKING COMPLETED
STREAM TYPE WORKED
UNWORKED CONTROL AREA
KOOTENAI NATIONAL FOREST
CABINET NATIONAL FOREST
CLEARWATER NATIONAL FOREST
SELWAY NATIONAL FOREST
P. O. T. F. A.
PEND OREILLE
COEUR D'ALENE NATIONAL FOREST
PRIEST RIVER
SANDPOINT
NEWPORT
BONNERS FERRY
TROY
LIBBY
HOPE
CLARK FORK
RATHDRUM
COEUR D'ALENE
KELLOGG
WALLACE
THOMPSON FALLS
HAUGAN
AVERY
OROFINO
MOSCOW
LEWISTON
KUSICK
CLEARWATER RIVER
KOOTENAI RIVER
LAKE PEND OREILLE
COEUR D'ALENE RIVER
ST. JOE RIVER
LOCHSA RIVER
MIDDLE FORK
NORTH FORK

Sugar Pine

Turning to the sugar pine region, the information for California and Oregon is shown on two separate groups of charts and maps. This one (Map T) shows in gray the area in which sugar pine is growing in California, and in green the areas in which it is of commercial importance. The next chart (Chart U) shows the land ownership situation in California where about half of the pine is in the National Forests.

It should be pointed out in connection with the California program that the white pine blister rust has not yet reached that State, although it is spreading down through Oregon and infections can be expected to be picked up in California at any time. Accordingly, it has been possible to devote attention in California thus far primarily to experimental operations with a view to reducing costs and finding methods by which the work can be carried out with the greatest efficiency and economy. Such experimental eradication was begun in 1926, and by the end of 1932 had covered 32,215 acres. It was expanded somewhat in 1933, but during the present year was materially increased so that the total area covered by this time amounts to 261,963 acres, as shown on the chart (Chart V). The total control area in California amounts to 2,004,330 acres.

The locations of the worked and unworked areas are shown on the next map (Map W). The green spots show those where the initial working has been completed, the blue spots represent the few sections which have been covered the second time, while the main body of the commercial sugar pine stands are shown in brown as not having received protection as yet.

In order to work the 190,935 acres covered in California during the past summer season, it has been necessary to use 490,680 man-hours of labor. In surveying the situation for the future, it appears that an ideal arrangement would be to increase this amount gradually for five or six years until about double the labor was being used as has been employed in 1934. From then on, the work could be materially decreased. Eventually, it is believed that the sugar pine stands can be kept on a maintenance basis of continued future production without fear of loss from the white pine blister rust by the use of not over 500 man-months a year as part of the regular forestry program of the National Government and the private owners.

As already stated, the sugar pine area also extends into Oregon. This map (Map X) shows the part of Oregon in which the commercial white and sugar pines are found, spots in the northern half of the area representing Western white pine, and plantations, and those in the southern half natural stands largely sugar pine. The green sections have already been worked. The commercial areas of white pine and sugar pine in that State total 195,986 acres. These stands are largely in private hands, and about 1/6 of both the private and Federally owned pine has been covered in blister rust control.

Mr. Wyckoff of the Spokane office of the Division is in charge of the Western blister rust work and has prepared the maps and charts used for that area and is available for answering any questions concerning them.

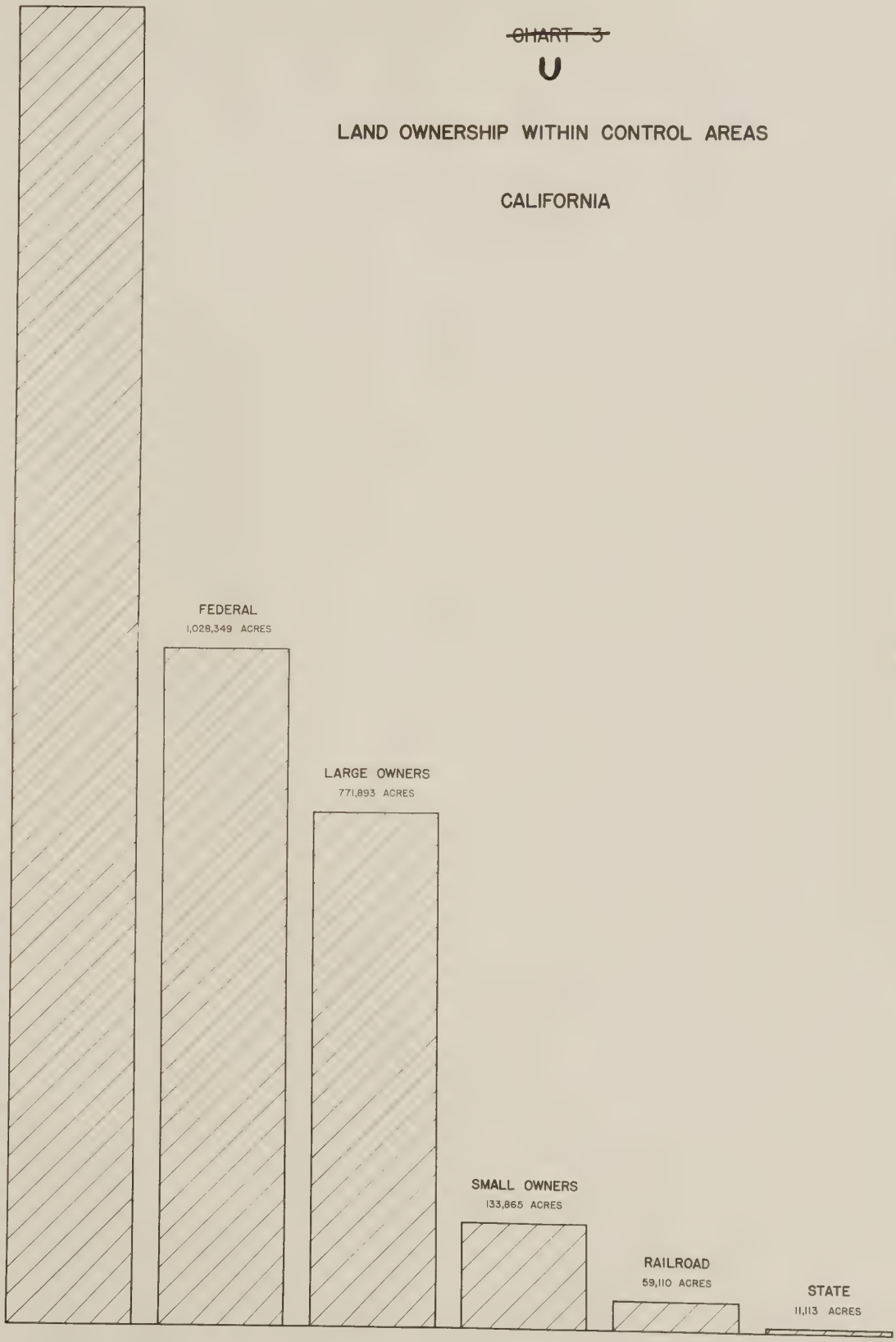

KLAMATH
SHASTA
TRINITY
LASSEN
MENDOCINO
PLUMAS
TAHOE
EL DORADO
STANISLAUS
SIERRA
SEQUOIA
PROGRESS
OF
BLISTER RUST CONTROL
IN
CALIFORNIA
LEGEND
DISTRIBUTION OF SUGAR PINE
COMMERCIAL SUGAR PINE AREAS

~~CHART 3~~

U

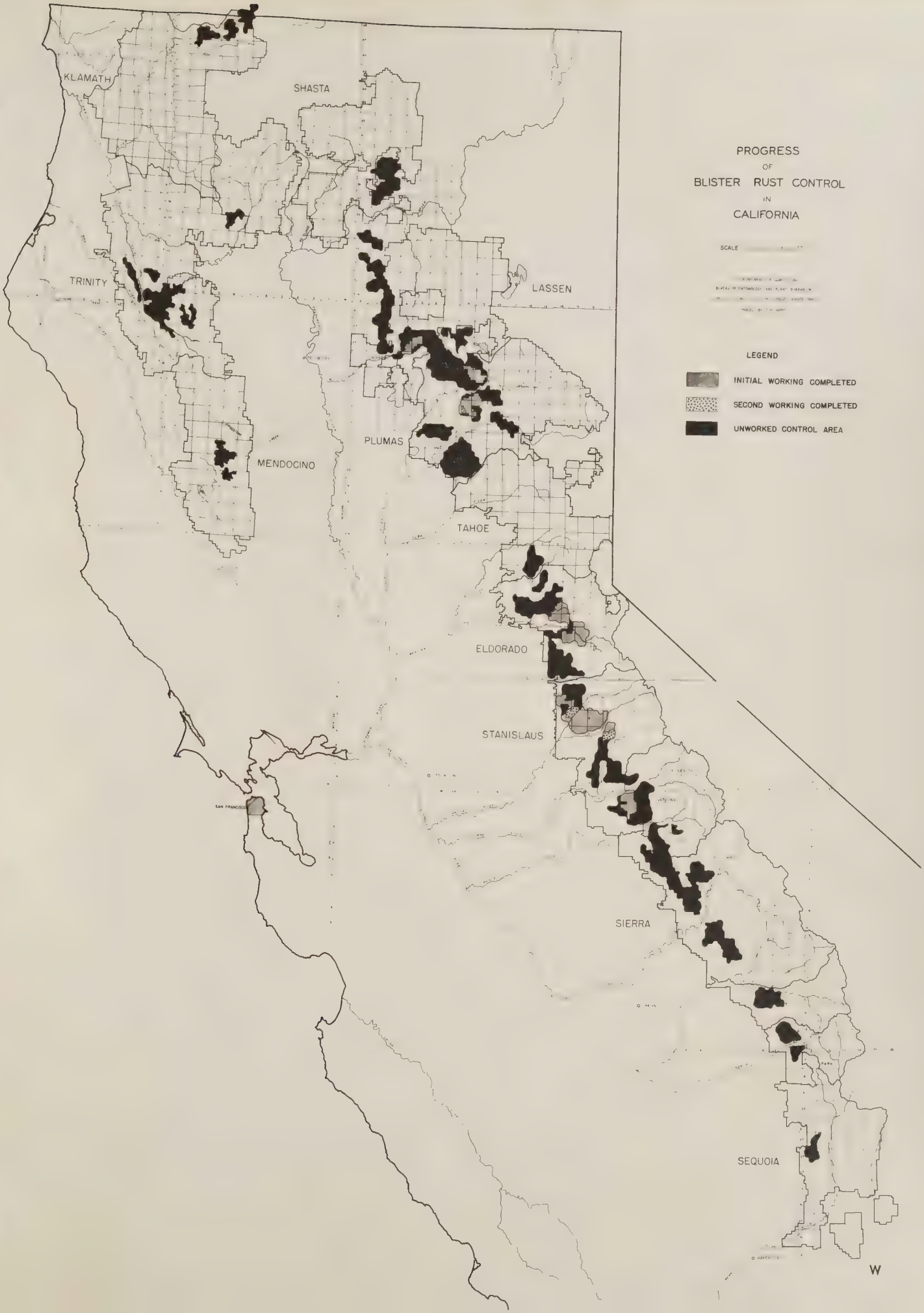
LAND OWNERSHIP WITHIN CONTROL AREAS

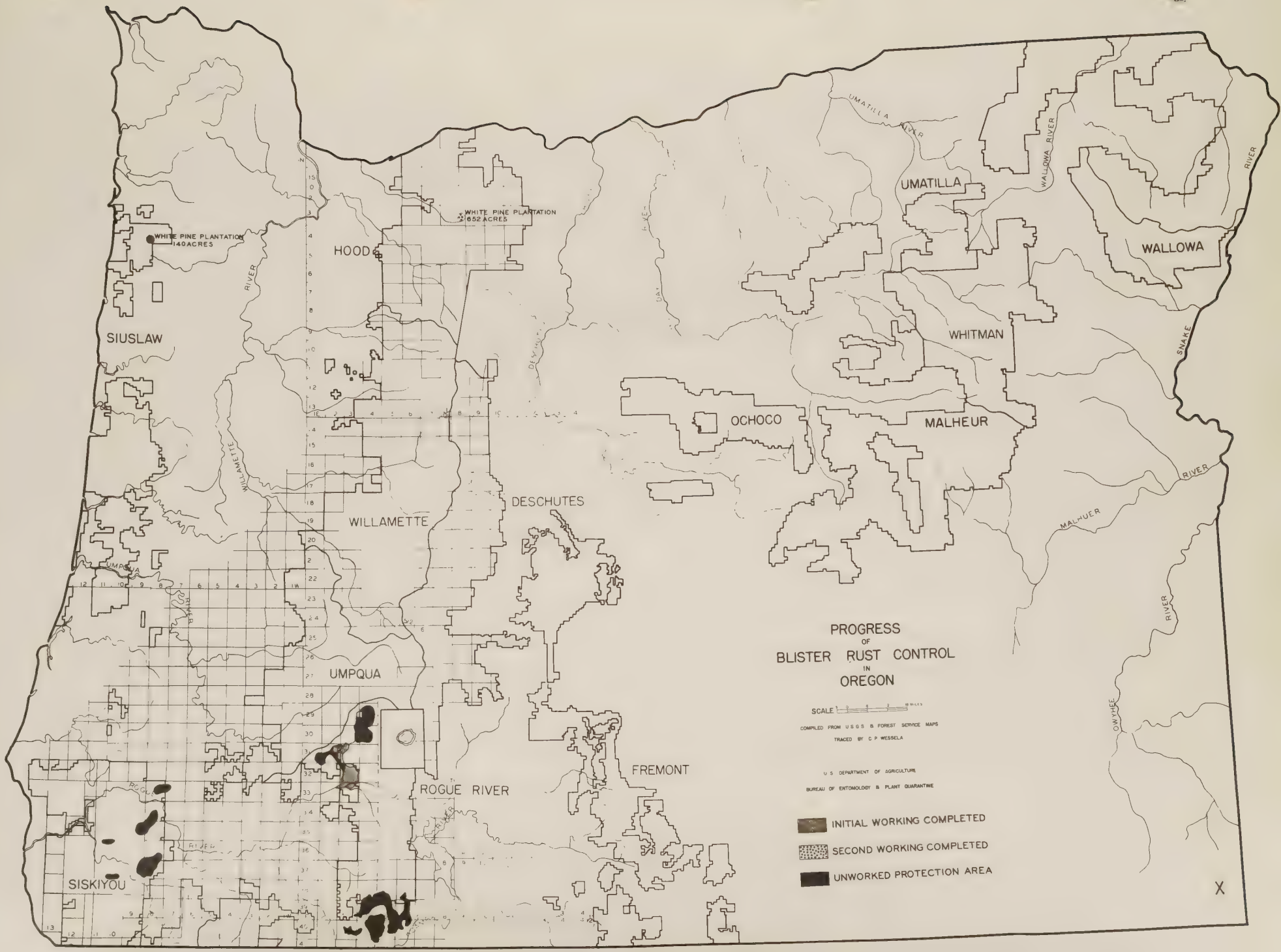
CALIFORNIA

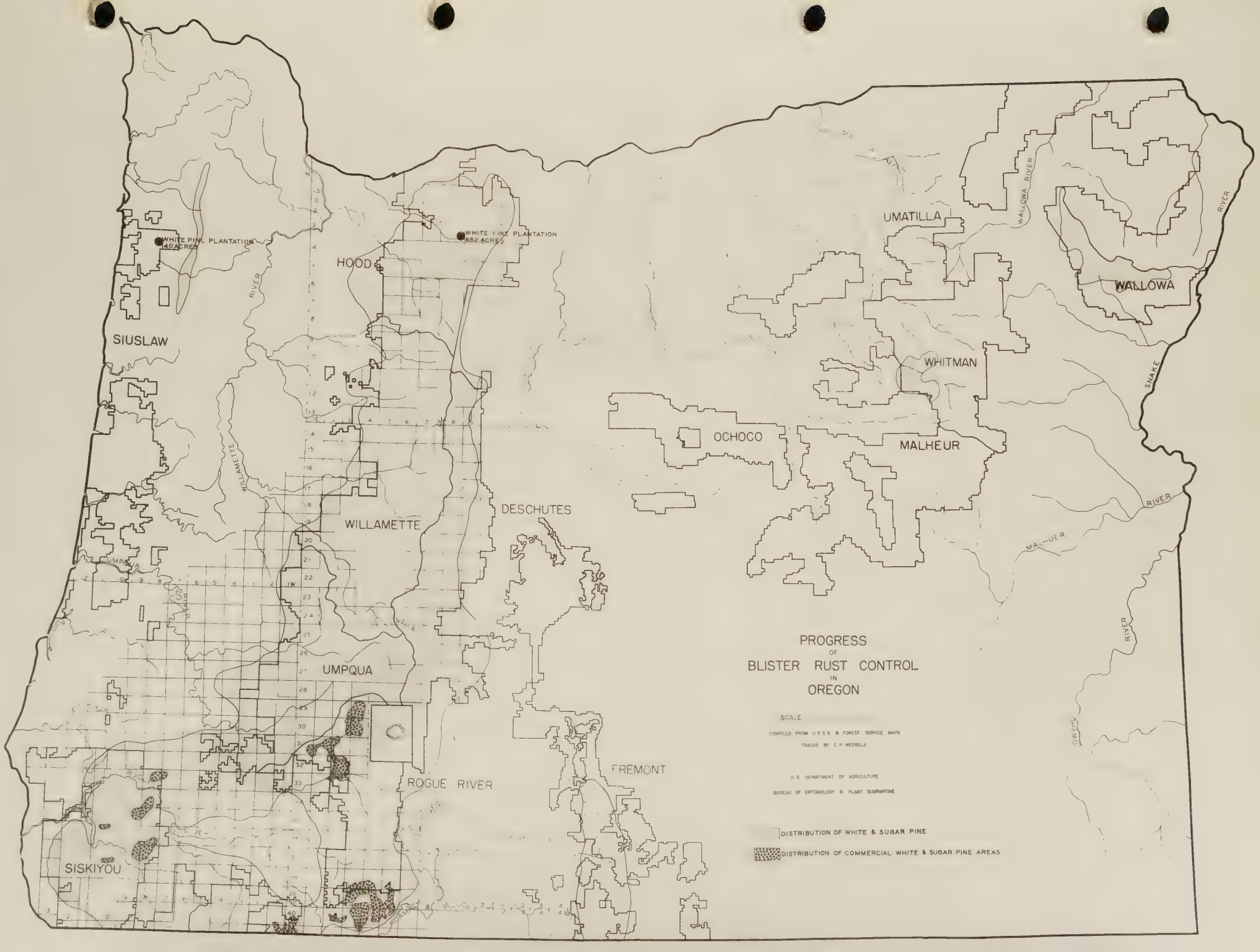


~~CHART 2~~
V

PROGRESS OF COMPLETE INITIAL WORKING BY LAND OWNERSHIP CLASSES CALIFORNIA


KLAMATH
SHASTA
TRINITY
LASSEN
PLUMAS
MENDOCINO
TAHOE
ELDORADO
STANISLAUS
SIERRA
SEQUOIA
PROGRESS
OF
BLISTER RUST CONTROL
IN
CALIFORNIA
SCALE
LEGEND
INITIAL WORKING COMPLETED
SECOND WORKING COMPLETED
UNWORKED CONTROL AREA
W


WHITE PINE PLANTATION
140 ACRES
WHITE PINE PLANTATION
652 ACRES
HOOD
SIUSLAW
WILLAMETTE
DESCHUTES
UMPQUA
ROGUE RIVER
FREMONT
SISKIYOU
OCHOCO
UMATILLA
WHITMAN
WALLOWA
MALHEUR
WILLAMETTE RIVER
DESCHUTES RIVER
JOHN DAY RIVER
UMATILLA RIVER
WALLOWA RIVER
SNAKE RIVER
MALHEUR RIVER
OWYHEE RIVER
PROGRESS
OF
BLISTER RUST CONTROL
IN
OREGON
SCALE
COMPILED FROM U.S.G.S. & FOREST SERVICE MAPS
TRACED BY C. P. WESSELA
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY & PLANT QUARANTINE
INITIAL WORKING COMPLETED
SECOND WORKING COMPLETED
UNWORKED PROTECTION AREA
X


WHITE PINE PLANTATION
40 ACRES
WHITE PINE PLANTATION
852 ACRES
SIUSLAW
HOOD
WILLAMETTE
WILLAMETTE
DESCHUTES
UMPQUA
UMPQUA
ROGUE RIVER
FREMONT
SISKIYOU
UMATILLA
WALLOWA
WHITMAN
OCHOCO
MALHEUR
SNAKE
RIVER
WALLOWA RIVER
MALHEUR
RIVER
OWYHEE
RIVER
PROGRESS
OF
BLISTER RUST CONTROL
IN
OREGON
SCALE
COMPILED FROM U.S.G.S. & FOREST SERVICE MAPS
TRACED BY C. P. WESSELA
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY & PLANT QUARANTINE
DISTRIBUTION OF WHITE & SUGAR PINE
DISTRIBUTION OF COMMERCIAL WHITE & SUGAR PINE AREAS

COOPERATION

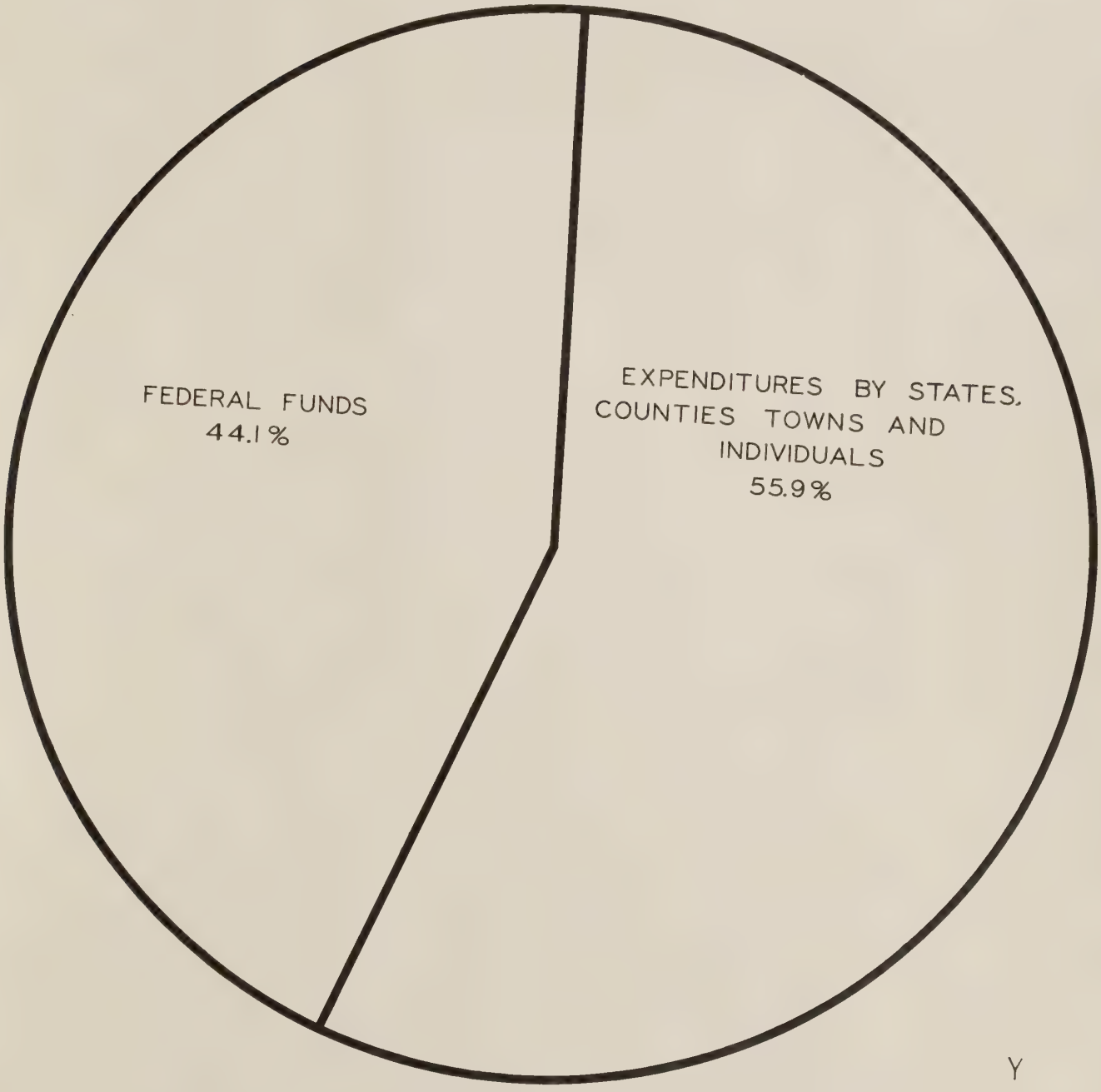
It should not be understood that all this blister rust control work has been done by the Federal Government through appropriations to the Department of Agriculture. As soon as the preliminary experimental work over 15 years ago showed that local Ribes eradication would result in the protection of single pine stands regardless of the continued presence of blister rust in the general area, a policy was adopted of leaving the actual labor cost to the private owners, States or local communities with the Federal Government bearing the expense of supervision, coordination, preeradication surveys, location of valuable pine stands and checking the results.

Control work is carried on in cooperation with 31 States and through them with local agencies and land owners. Also cooperation is given to Federal agencies administering public lands such as the Forest Service, National Park Service, and Indian Service. The Bureau uses its organization of highly trained and experienced personnel to coordinate the control activities of the several cooperating agencies and through leadership, technical direction and supervision, brings about a unified effort and high standard of eradication efficiency in the establishment and maintenance of control over extensive forest areas.

As shown in this chart (Chart Y) the expenditures by States and local agencies in the Northeastern States up to 1933 actually exceeded the funds spent by the Federal Department. In the western white pine area, States and private owners have borne $141,000 of the cost of the work from 1928 to 1934, inclusive. The depression which was gradually becoming more severe by 1932 seemed to make it difficult or impossible for pine owners and local communities to continue to carry their share of the expense. Meanwhile the blister rust was continually becoming worse in the unprotected areas and threatened to be responsible for irreparable damage by the time pine owners and local governing agencies could get back on their feet financially. Accordingly, the Public Works Administration in August, 1933, made an allotment of $2,050,000 to be available until next June (1935). For the present fiscal year no regular appropriation was made for blister rust work by Congress and the entire regular expense including the administrative, supervisory, labor and all other regular phases are being carried by this emergency allotment, about $1,000,000 of the amount being available this fiscal year.

Meanwhile another factor, the Emergency Conservation Work, operating through the Civilian Conservation Camps, has entered the picture. Also relief agencies of various kinds have assigned laborers in several areas to blister rust activities.

COOPERATIVE EXPENDITURES BLISTER RUST CONTROL
NORTHEASTERN STATES 1918 – 1933



Y

TOTAL EXPENDITURES: $4,855,034.67

TABLE Y Y

Acreage from which Ribes was eradicated by regions and programs (1934)

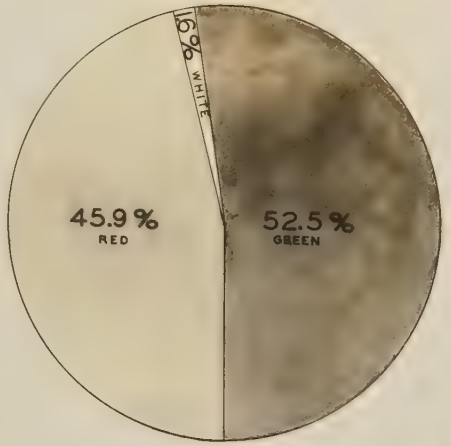
Region	Acreage worked 1934	Proportions covered by each agency		
		E.C.W.	E.R.A.	Reg. & P.W.A.
N.E. States	814,229	45.9	1.6	52.5
So. App.	963,423	5.2	.0	94.8
Lake States	485,568	57.0	17,1	25.9
W. Wh. Pine Region	673,232	32.0	1.5	66.5
Sugar Pine Region	215,273	0.5	.0	99.5
TOTALS	3,151,725	29.1	3.1	67.8

The five circles on this chart (Chart Z) show how the acreage covered in 1934 has been taken care of. The red shows the proportion of the acreage covered by the C.C.C. and white that covered by relief labor. The green includes the acreage for which the labor cost was paid out of the P.W.A. allotments to the Bureau, the Forest service and other agencies, and such cooperative funds as were available this year. In addition, the expenses of coordinating and directing all these classes of labor, (including C.C.C. and relief) were borne by the Public Works allotment.

This next table (Chart AA) shows in more detail the part played by the C.C.C. since its organization in 1933. It will be seen that all agencies combined during the past two seasons covered 4,187,567 acres, of which the C.C.C. were responsible for 1,542,837, or 37 percent. The value of the C.C.C. for this purpose varied greatly in the different regions. In the Northeastern States they took care of 45 percent of the acreage, in the North Central States 64 percent and in the Western white pine region 42 percent. On the other hand, they covered only 7 percent of the work done in the Sugar Pine belt and only 12 percent of the work accomplished in the Appalachian Region.

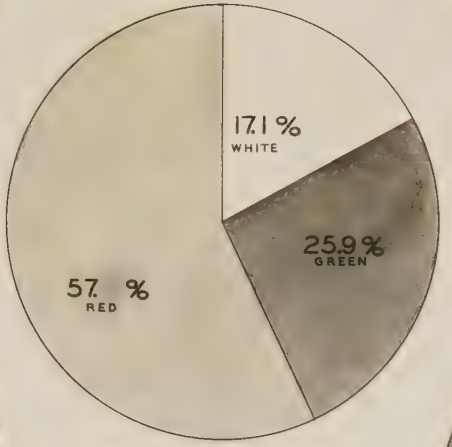
It should be pointed out that in the case of the Southern Appalachian Region and in parts of the other States, the pine is in such scattered stands and Ribes occur in such comparatively small numbers that an organization such as the C.C.C. can be of very little assistance. In other regions they can perhaps provide the bulk of the labor if the camps are satisfactorily located for the purpose and if a capable and experienced blister rust organization is maintained for preeradication surveys, supervision and checking.

ACREAGE WORKED IN 1934
BY THE DIFFERENT PARTICIPATING AGENCIES

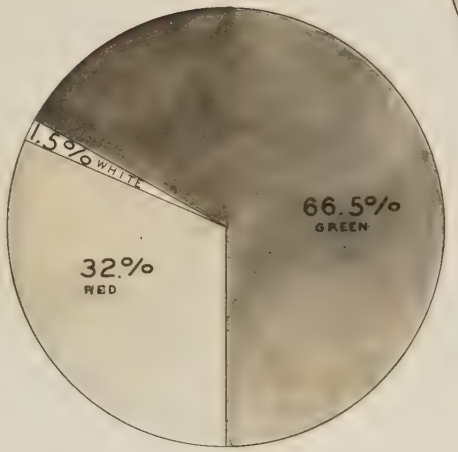


N. EASTERN REGION

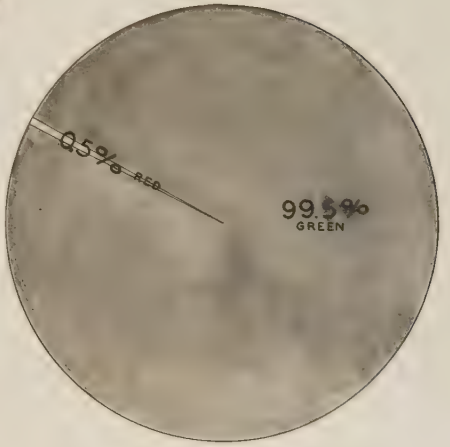
SO. APPALACHIAN REGION



LAKE STATES REGION



W. WHITE PINE REGION



SUGAR PINE REGION

REGULAR PROGRAM INCLUDING P.W.A STATE AND LOCAL COOP. ACENCIES.

C.C.C.

E.R.A.

Z

RELATION OF CIVILIAN CONSERVATION CORPS TO THE BLISTER RUST CONTROL PROGRAM IN UNITED STATES DURING 1933 & 1934

PINE REGION	TOTAL ACRES CLEARED OF RIBES ALL AGENCIES	ACRES CLEARED OF RIBES BY C.C.C.	PERCENT ACREAGE CLEARED OF RIBES BY C.C.C.	MAN DAYS PER ACRE ALL AGENCIES
NORTHEASTERN STATES N.E., N.Y., PA., & N.J.	1367084	619454	45	.26
SO. APPALACHIAN STATES, MD., VA., W. VA., TENN., N.C., S.C., KY., & GA.	1042627	125165	12	.02
NORTH GENTRAL STATES, MICH., WIS., MINN., IA., ILL., IND. & OHIO.	619546	397696	64	.30
WESTERN WHITE PINE, MONT., IDAHO & WASH.	897180	380962	42	.75
SUGAR PINE ORE. & CALIF.	261130	19560	7	.38
ALL	4187567	1542837	37	.34

AA

FUTURE

At this conference we are especially interested in the possible future of the blister rust problem. In accomplishing such progress as has already been made in protecting the commercial white pine areas in the United States, a wide variety of public and private agencies have had their part. Each of the various plans of cooperation tried, has been successful in establishing commercial control of blister rust under forest conditions with the possible exception of a method used in one of the New England States for several years. There the owners were expected to do the Ribes eradication work themselves with the assistance of and under the direction of an inadequately trained town foreman. Under this plan the efficiency was so low that infection has continued to increase in the pine stands of that region.

Competent supervision is essential in proper control in order to accomplish results and to avoid the waste of funds. The Federal Department of Agriculture through this Bureau and the Forest Service would appear to be in the best position to provide uniformity and efficiency in this supervision, both because its organization covers the entire United States and because of the extensive experience of its personnel. It can be expected most satisfactorily to take the responsibility, first, for locating the pine stands which are worth protecting; second, for the preeradication survey to determine where the Ribes are numerous enough to require removal by a crew; third, for mapping, outlining and planning the crew work, and fourth, for checking the results to be sure that there have not been so many Ribes missed as to endanger the pine.

A second Federal responsibility which can hardly be shifted is the cost of labor on the National Forests and other Federal property. The Forest Service representatives here will doubtless discuss that problem.

On the other hand, it is an open question whether the cost of labor for the actual crew work on private and State land should be borne in any large part by the Federal Government. One of the objects of this conference is to learn the feeling of those in attendance as to whether the states, counties and townships are ready to assume that part of the work and whether the private owners should, and are in a position to, bear those costs themselves.

ALTERNATIVES

Before closing, it seems best to mention briefly certain other phases of the blister rust control problem which may be overlooked in any analysis that is confined to the financial relations of cost to returns. Among these is the question, "What is the alternative to blister rust control in white pine growing regions?" The States and owners concerned do not have a choice between white pine and other kinds of trees in the way in which a farmer can choose to plant either oats or corn, or either tobacco or cotton. The destruction of white pine leaves much of the land useless and valueless. The white pine is seeding itself on increasingly large areas and in the Appalachian Region seems likely to take the place of the nearly vanished chestnut. If these pine trees are to be slowly killed by blister rust before they can reach a size of any value, they will have

occupied the ground for the intervening period and destroyed the only possibility of the land's returning a profit to the community. If the forests of these areas are to be of any value, therefore, it becomes necessary to compare the cost of Ribes eradication with that of clearing the land and planting it to some different kind of tree at a cost of $10 to $15 per acre, or much more, as well as to consider the reduced value of the less desirable species which must be substituted. There also arises the question of what to do with those mixed stands in which white pine is the only tree of high enough quality to carry the costs of a lumber operation. In such regions cutting will have to be discontinued if and when any considerable proportion of the white pines begin to die of blister rust. In such regions white pine may be the only basis of continued community existence. Instances of this kind occur not only in the remote sections of the Bitter Root Mountains and the rest of the Inland Empire but also in parts of the New England States. Representatives of these areas are doubtless present and I refer to that situation at this time only because it forms an importance part of the whole picture.

Another aspect of the blister rust control problem is its relation to unemployment. The steady intensification of blister rust in the United States for two decades and the great acreages of pine to be protected has made foresters wonder whether it would ever be possible to obtain enough labor to carry out the needed work. In the last several years, however, this country has had to make provision for taking care of large numbers of people who could not be placed in industry. During the past summer, some 19,000 men have been employed in removing the currant and gooseberry plants on 3,151,000 acres of land. Two-thirds of these men were enrolled in C.C.C. camps and the remainder have either been employed directly for this work or have been assigned from relief agencies. Only very limited expenses for materials are necessary. These are to carry out Ribes eradication in those localities where hand pulling is impracticable. The Blister rust control project thus offers opportunity for using laborers in very considerable numbers on useful and profitable work at little expense for materials and equipment. On the other hand, the destruction of pines by blister rust would destroy communities and industries, and further aggravate the unemployment problem.

SUMMARY

The discussion of the present status and possible future of blister rust control may be summarized as follows:

1. White pine is an important forest tree in some 31 states, 21 of which have been reached by blister rust.

2. The standing timber has a stumpage value of some $400,000,000 and is the basis of the economic life of many extensive parts of the United States. The mill value of the 5-leaf pine cut in 1929 was over $50,000,000. Stands considered of present or future commercial value cover 14,200,000 acres in the U. S.

3. Where blister rust has reached an area, white pine cannot survive long enough to reach a size of value for cutting if currant and gooseberry

plants are growing in the vicinity to spread blister rust infection year after year. In the future, it will never be possible, at least in the Northeastern States and the northern Rocky Mountain Region, to produce a crop of white pine in the presence of Ribes.

4. The average costs of initial Ribes eradication vary from 24 cents to about $3.00 per acre in different regions, as compared with costs of $10 to $15 per acre to plant species other than white pine.

5. During the past 15 years, over half of the white pine stands of the United States have been protected by initial Ribes eradication.

6. To mature a crop of pine 60 to 100 years old, most pine stands must have the Ribes removed in the vicinity two or three times at intervals of 3 to 15 years depending on conditions.

7. Blister rust control has important angles from the standpoint of unemployment and of the continued maintenance of community life in white pine growing areas.

8. Important questions for consideration as to the future include: To what extent are further investigations as to control measures needed to reduce the costs of eradication in some areas? What are the best ways and means of financing the needed field program of continued Ribes eradication, with special reference to the cost of labor on private and state land and the part which such organizations as the Civilian Conservation Camps and the various relief agencies can take in continuing this work, in connection with the blister rust control unit which is organized to promote the efficiency of control operations, direct and coordinate the work where it is most needed, and check the results?
